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EXAMINATION FOR LIFE INSURANCE

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THE

MEDICAL EXAMINATION

FOR

LIFE INSURANCE

GREENE

THE

MEDICAL EXAMINATION

FOR

LIFE INSURANCE

AND ITS

ASSOCIATED CLINICAL METHODS

WITH

CHAPTERS ON THE INSURANCE OF SUBSTANDARD LIVES AND ACCIDENT INSURANCE

BY

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WITH 99 ILLUSTRATIONS

PHILADELPHIA

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TO

DR. WILLIAM OSLER

Kindest and most helpful of friends, as a slight token of the admiration, affection, and respect of

THE AUTHOR

PREFACE.

Within the past two years a considerable number of medical schools have introduced into their curriculum a special course of lectures dealing with the medical aspect of life insurance. This action has been taken in response to the general request of life insurance companies, and is undoubtedly a step in the right direction.

It may not be true that this department of medical work should rank as a specialty, but it can not be denied that in his capacity as an examiner the physician is confronted by many problems quite distinct and apart from those encountered in the ordinary practice of medicine. That examiners have felt the need of special instruction in this branch is proved by the wide circulation of the older insurance manuals, and it is certain that never was this need greater than at the present time.

The insurance companies complain that, because of a lack of thorough knowledge and intelligent appreciation of their requirements, the service rendered by physicians is in many respects disappointing. In this manual an attempt has been made to supply all information necessary to the undergraduate or the examining physician and yet to give only such as is of real and practical value.

It is not important that the local examiner should be a medical director as well. The functions of the two offices are quite separate and distinct, and although many companies ask for an opinion as to the advisability of accepting the risk, others ask only that the essential facts be given, and are themselves willing to assume the whole responsibility involved in an acceptance or a rejection.

The proper presentation of any case must necessarily demand a thorough appreciation, not alone of the medical problems

involved, but of the practical side of the question as well. The author has endeavored, therefore, to interest readers in the history and development of life insurance, and to briefly set down the fundamental principles upon which it is based. He has tried to cover thoroughly all of the minor questions that are likely to arise and prove sources of misunderstanding or friction between the home office and the examiner, or unfavorably affect the relations of the latter with the agent in the field or the applicant for insurance. A special effort has been made to explain, definitely and clearly, such questions as appear upon a medical examination blank, and to show why they are there, what they demand, and how best to secure correct and satisfactory answers.

Realizing the fact that many readers will be undergraduates, no effort has been spared in writing the chapters devoted to the examination of the heart and lungs, to outline a correct technic, and explain clearly the best means of eliciting physical signs, and of giving to them their proper interpretation and value. So also, in the chapter relating to the examination of the urine, an attempt has been made to emphasize the necessity for correct methods of procedure, and show that the use of an up-to-date technic is quite consistent with rapid work and simple tests.

Special chapters have been written upon such important subjects as "occupation," "heredity," "the rôle of inspection in diagnosis," and upon that interesting topic, "conspiracies to defraud life insurance companies."

Through the kindness of a veteran medical director, Dr. J. B. Lewis, we are able to present a chapter upon "accident insurance" that can not fail to interest both the surgeon and the general practitioner; and, finally, an attempt has been made to state in a conservative way the present status of that much debated question, "the insurance of substandard lives."

The amount of work involved has been out of all proportion to the apparent difficulties of the task, and the completion of the book would have been impossible, but for the kind and ready assistance of many friends, both lay and professional. Wherever possible this obligation has been acknowledged in the text, but to the many whose names can not be here set down, the author desires to express his earnest thanks. Special mention must be

made in the case of Drs. Wm. Osler and Chas. E. Simon, to Medical Directors E. J. Marsh, E. W. Lambert, Brandreth Symonds, O. H. Rogers, A. B. Bisbee, and Geo. R. Shepherd, and to Messrs. David Parks Fackler and Jacob L. Greene, all of whom have rendered the greatest assistance by the reading and criticism of manuscript or through valuable suggestions. Acknowledgment is also due to the officers of the Equitable Life Assurance Society for special favors extended in connection with the use of their valuable insurance library. Finally, the author would be lacking in gratitude did he fail to acknowledge the unvarying courtesy and generosity of the publishers.

CHAS. LYMAN GREENE.

ST. PAUL, MINN., *November, 1900.*

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THE NATURE AND GROWTH OF LIFE INSURANCE.

Life insurance, at once the most beneficent and unselfish of all business institutions, owes its present success, in no small measure, to a study of the hazards of the gaming table. Nevertheless, it is the direct outgrowth of that love of family common to all men, whether barbarous or civilized; and one may safely assume that such protection as it affords in its primitive form is older than the pyramids.

Ancient fraternal orders.

Ancient Gilds.—Long before the Christian era there existed in both Greece and Rome mutual or fraternal orders that cared for their sick and infirm members.* Some of the ancient gilds, in addition to requiring their candidates to be holy, pious, and good, are said to have exacted an examination; † and one of the most admirable characteristics of the older gilds and corporations of London has ever been the aid and comfort afforded their members in time of sickness and distress.

The Anglo-Saxons.—The turbulent Anglo-Saxon organized

* Pliny, "Epistle X." Lecky, "History of European Morals," vol. II, p. 79.

† Holden, "Selection of Lives for Insurance," "Reference Handbook of Medical Sciences."

various societies for mutual protection and assistance, both before and after the Norman invasion, and certain of the early English gilds provided for sick benefits, for indemnity for fire losses, and, indeed, for relief from almost every imaginable form of calamity. The rules of the "Gild of the Thanes of Cambridge" not only provided for the burial of its members, but also contained a curious provision that serves well to illustrate the then unsettled condition of society: Murder being a common incident, the Gild undertook to provide a money indemnity in the event of the killing of one member by another, and their rules contained the following quaint proviso: "If he [the homicide] be poor, the Society shall pay: if deceased was worth 1200 shillings, each member half a mark; but if a hind, two oræ; *and if a Welshman, only one.*" *

"Gild of the Thanes of Cambridge."

Curious rating.

Dark days.

Dark Days.—From the simplest organization, as exemplified by the ancient gilds, to the complicated system of modern times was a far cry, and the philanthropy and beneficence that characterized life insurance in the days of the early friendly societies were well-nigh lost in the foul mire of dishonesty and corruption into which it sank during the succeeding centuries.

Pilgrims and Crusaders.

The insurers of that period could see nothing in the question beyond a wager, and such, in fact, it remained until the closing years of the seventeenth century. Pilgrims seeking a distant shrine might be insured against slavery or death, adventurous mariners might be assured of a ransom in event of their capture by enemies, men might buy annuities for extravagant sums, but all was pure chance, and the premium exacted by the Jews and Lombards was always sufficiently great to give the insurers the long end of the wager. In short, equitable life insurance was an impossibility under such conditions as prevailed all over the civilized world during the feudal times, and, indeed, up to the eighteenth century.

The Keystone of the Arch.—The fundamental principle of

* Walford, "Insurance Cyclopedia": "Friendly Societies."

NOTE.—Ulpianus, the Prætorian prefect, published, 364 A. D., a remarkable table for the valuation of annuities, made necessary by the Falcidian law of inheritance. These tables show conclusively that the Romans of that early period had more accurate knowledge concerning the "expectation of life" at different ages than was possessed by the moderns up to the last years of the seventeenth century.

life insurance is indemnification of the family of an individual against the pecuniary loss incident to his death ; but as this must be furnished at the lowest cost consistent with safety, it follows that to be equitable it must be based upon scientific and exact methods. To insure men against the contingency of their death demands that the laws governing mortality shall be thoroughly understood, and that influences leading to unusual or extreme fluctuations in such mortality shall either be absent or reduced to a minimum.

Longevity, Individual and Collective.—One can not even now predict the duration of life for an individual, but he can very accurately forecast the average duration of life for a large group of men and women. He knows that of any number of persons living in a certain year a definite number will die during the year following. And so, taking the same group and carrying it on from year to year, he finds it gradually shrinking until the last hoary survivor has fallen by the wayside.

The "Bridge of Life."

Unsettled Condition of Early Society.—With these facts in mind one has only to read the history of the social life of the people during the period prior to the eighteenth century to realize tnat before that time any genuine life insurance was manifestly impossible.

At a time when every man held, almost literally, his life in his hand, and had only his personal strength or skill of fence as a guarantee of longevity, when kings were made and unmade in a day and dynasties crumbled like houses of cards, when loathsome disease stalked unopposed over the land, and love of gold, fanaticism, or mere spirit of adventure sent men on perilous quests by sea and land, it could hardly be supposed that the insuring of life could be carried on upon terms that would make it anything more than a grim wager.

Tenure of life uncertain.

It is difficult to realize now what changes have been wrought not only in the mere pleasure and comfort of living, but in the stability of life itself.

Ancient Homes and Customs.—To appreciate the changed conditions, we must imagine a people living in houses without chimneys; walking on floors of dirt covered with rushes, changed only when caprice dictated; living and sleeping in drafty or ill ventilated rooms, improperly heated and imperfectly

Impure air and filth.

lighted, and thus offering in their persons and their surroundings an inviting soil for the development of disease.

Drunkenness and brawling.

In those days all sanitary laws, even that of personal cleanliness, were disregarded, drunkenness was a virtue, and readiness to wield the cudgel or draw the sword the test of manliness. Wars devastated the land, impoverished the people, and served not alone to decimate the younger and more robust portion of the nation, but to withdraw annually thousands of men from productive employments and send them to death, or make them serve as living instruments of infection with the diseases of foreign countries or the camps. What wonder that life was unstable and death ever abroad in the land!

Wars.

Even the companies organized in the eighteenth century had to deal with the greater part of such unfavorable conditions, for, strange to say, nearly one-quarter of the nineteenth century had slipped past before these matters underwent a radical change.

Nineteenth century.

Early Nineteenth Century Sanitation.—In an interesting and recent work * it is written that in the earlier years of this century there was a marked change in the architectural arrangement of dwellings of the rich, less attention being devoted to exteriors and more to interiors, and the author further says: "The space was not all sacrificed to reception rooms, bedrooms were multiplied and enlarged, and fireplaces were introduced into every room, transforming the arctic 'powdering closet' into a habitable dressing-room. The diminishing of the window tax made light and ventilation possible. *Personal cleanliness became fashionable*, and the means of attaining it were cultivated. The whole art or science of domestic sanitation, rudimentary enough in its beginnings, belongs to this century.

Cleanliness becomes "the mode."

"The system which went before it was too primitively abominable to bear elaborate description. Sir Robert Rawlinson, the sanitary expert, who was called in to inspect Windsor Castle after the Prince Consort's death, reported that within the Queen's reign 'cesspools, full of putrid refuse, and drains of the worst description existed beneath the basements.' Twenty of these cesspools were removed from the upper ward and

Cesspools under Windsor Castle.

* "Collections and Recollections," p. 71, Harper Bros., N. Y., 1899.

twenty-eight from the middle and lower wards." No wonder that our author deems the following verse apropos:

> "We must revere our sires; they were a famous race of men:
> For every glass of port we drink, they nothing thought of ten;
> They lived above the foulest drains, they breathed the closest air;
> They had their yearly gout, but little seemed to care."

If this were the condition of the better class in the early part of our own century, it is not difficult to understand how deplorable must have been the environment of those living in the earlier centuries.

The Ravages of the Black Death.—A writer says of life in the Elizabethan era: "The most dreadful and destructive epidemics, the brood of this insanitation, devastated the land and swept unchecked across continents and over seas."

In the "Merrie England" of romance and history ague was endemic, and cholera a frequent visitor, while again and again the "plague" repeated its unwelcome visitations. "Merrie England" a misnomer.

The Great Plague.—None read unmoved the horrible tale of Defoe, so true to essential facts as to deceive his contemporaries and lead them to believe it a veritable account of the "Great Plague." The actual chronicles are quite as ghastly. That gallant gentleman, John Evelyn, writing under date of July 16, 1665, says, "There died of the plague in London this week, 1100, and in the week following above 2000." On August 15th appears the terrible statement, "There perished this week 5000." Two weeks later he reports it increasing, and says that he has sent away his family, being himself resolved to stay and watch over his charge, "Trusting in the providence and goodnesse of God." Returning from a trip to Chatham on September 7th, he reports that 10,000 were perishing weekly, and says that it was "dangerous to see so many coffines exposed in the streetes, now thin of people, the shops shut up and all in mourneful silence." Evelyn's diary.

The death-rate was frightful. It has been estimated that one-fourth of the total population of Europe was swept away by this filth-born "Black Death." Within a period of seventy-three years London was five times visited, and the mortality reached the appalling total of 161,344 deaths. In order to appreciate this statement one must remember that the London Frightful death-rate.

of 1660 (within the limits of the "Bills of Mortality") probably represented only 460,000 inhabitants.

DEATHS DUE TO PLAGUE IN LONDON, 1593–1665 INCLUSIVE.

Year.	Estimated Population.	Deaths from Plague.	Births.	Excess of Total Deaths over Births.
1593, . . .	160,000	10,662	4021	13,823
1603, . . .	200,000	36,269	4789	37,253
1625, . . .	. .	35,417	6783	47,482
1636, . . .	. .	10,400	9522	13,837
1665, . . .	460,000	68,596	9967	87,339
		161,344		

"Encyclopædia Brittanica," ninth edition, p. 827, vol. XIV.

The Red Cross.—One can readily understand why infected houses in which sick and well were imprisoned together were marked by a red cross and the legend, "**Lord Have Mercy Upon Us.**" *

Good out of evil.

The "Bills of Mortality."—Even so foul a wind could blow some good, and, strangely enough, it was the visitations of the plague that led to the establishment of the "Bills of Mortality" in 1593, and their regular publication in 1620. These were simply a weekly statement of the deaths and their supposed cause. Ages were not given until 1728, even in the parish registers, established in 1538. Referring to the "Bills of Mortality," Francis says: "When any one died, it was indicated by tolling or ringing a bell, or by bespeaking a grave of the sexton.

"Searchers."

The sexton informed the searchers, who hereupon repair to the place where the dead corpse is, and by view of the same and by other inquiries they examine by what disease or casualty the corpse died. Hereupon they make their report to the parish clerk, and he, every Tuesday night, carries in an account of all the burials and christenings happening that week to the parish clerk's hall."

* "That every house visited be marked with a red crosse of a foot long in the doore evident to be seene, and with these small printed words, that is to say, *Lord have mercy upon us.*" The Plague. Certain necessary Directions as well for the Cure of the Plague as for preventing the Infection, etc. Set downe by the College of Physicians, by the King's Majesties special command. London, 1636.

Curious Medical Terms.—Some odd terms appear among the causes of death: "Dysentery" was known as "flux," "scouring," or "griping." "Blasted and planet" occupied the place now given to those vague modern terms, or rather confessions of ignorance, "heart failure" and "general decline." "Head-mould-shot" and "horse-shoe-head" stood for "hydrocephalus"; and "tissick" for "phthisis." "Rising of the lights" is somewhat of a mystery, but is believed to have covered "croup," "diphtheria," and "edema of the glottis."

"Blasted and planet."

Smallpox.—One of our historians tells us that in these days it was the exception to meet a person who lacked pockmarks, and Francis very aptly says that "smallpox was then met only by an attempt to stare it out of countenance." The patient was clothed in scarlet, and his bed and the walls were covered with the same material. This is the more interesting in view of the fact that it has recently been stated, upon scientific and clinical grounds, that red glass in the windows will, by shutting off the ultra-violet rays, prevent pitting in smallpox.

Pockmarks universal.

The Statistics of Gambling.—The "Bills of Mortality," meager though they were, paved the way for better statistics, and, curiously enough, the study of the mortality tables for the purpose of determining the average duration of life was undoubtedly promoted by the interest taken in the "doctrine of chances" as applied to the various forms of gambling, then so universal in all grades of society. Christian Huygens, writing in 1657, gravely considers such a problem as this: "To find in how many throws one can bet to throw two sixes with two dice." Among the various solutions appears the following: "He who bets in four throws has an *expectation* of $\frac{71}{1296}$ a." *

The "doctrine of chances."

The celebrated Leibnitz when asked what benefit was to be anticipated from such calculations replied, "It is to perfect that art of arts, the art of thinking" ("c'est pour perfectionner l'art des arts, l'art de penser").

In 1662–1676 Graunt published some remarkable tables upon the bills of mortality, though, as he lacked knowledge of the population of London and even of the ages of the dead, his

Graunt's tables.

*"Van Reckiningh in Spelen van Geluck," translated by Ernst Willem Scott, Actuary, Amsterdam: "Transactions Actuarial Society of America," vol. IV, p. 314.

figures could be only approximate. It was this remarkable man who said, and that truly, "The more sickly the years are, the less fruitful of children they be." One of his contemporaries, Sir Wm. Petty, proved by abstruse calculation that the world must be fully peopled in 2000 years, and, not satisfied with this leap into the future, went further, and calculated the "number of the quick and the dead who may rise at the last day, 20,032,000,000 were the exact figures."

Sir Wm. Petty.

His "Day of Judgment."

This man was greatly admired for his remarkable versatility and ability. Proficient alike in mathematics, mechanics, and physics, it is to be hoped that his mathematics are not to be judged by the foregoing calculation, nor his mechanics by his double-bottomed ship, which foundered in the Bay of Biscay. As a physician, he actually raised from the dead, or rather resuscitated, a "poor wench hanged for felony." Evelyn said and believed, "There is nothing difficult for him."

He raises the dead.

From the time that Graunt's tables were published interest in the problems of life expectancy steadily grew, and in 1671 Johan De Witt, Grand Pensionary of Holland, published the first genuine mortality table. In 1693 the Royal Astronomer, Halley, published his table, based upon the statistics obtained from the little town of Breslau, the only place that then recorded the ages of its dead. This table was unfortunately lost sight of, and remained for many years buried in the voluminous transactions of the Philosophical Society. De Witt's book remained one of the scarcest until 1879, when a facsimile was printed at Haarlem by the press of Joh. Enschede.

De Witt's tables.

Halley's tables.

HALLEY'S TABLE* (Abridged).

Out of	1000	born,	661	will be living at	10	years of age.	
"	"		628	"	"	15	"	"
"	"		598	"	"	20	"	"
"	"		567	"	"	25	"	"
"	"		531	"	"	30	"	"
"	"		490	"	"	35	"	"
"	"		445	"	"	40	"	"
"	"		397	"	"	45	"	"
"	"		346	"	"	50	"	"
"	"		292	"	"	55	"	"
"	"		242	"	"	60	"	"
"	"		192	"	"	65	"	"
"	"		142	"	"	70	"	"
"	"		88	"	"	75	"	"
"	"		41	"	"	80	"	"
"	"		19	"	"	84	"	"

* Francis.

Following Halley's table came those of Dr. Price, the Northampton, the Chester, and the Swedish National. Dr. Price.

The Northampton table was used as a working basis by many companies, which was unfortunate, inasmuch as it proved to be very faulty, making the average lifetime six years less than it really was at that time. The source of this error lay in the curious fact that Northampton contained a large number of Baptists who did not believe in infant baptism, and hence there was a most misleading ratio of births to christenings.

Somewhat later one reads of that extraordinary character, Thomas Simpson, who, prior to 1740, when he published a work upon the nature and the laws of chance, is said to have been a vagabond, his most notorious exploit having been an attempt to "raise the devil," presumably by incantation, a venture that resulted in sending his pupil to a madhouse. This strange man contributed largely to insurance literature, and his writings are said to be remarkable for their clearness and accuracy, and their superiority over anything previously written. Thomas Simpson. Attempts to "raise the devil."

Period of Speculative Insurance.—During the period of speculative insurance (1698–1760) people were insurance mad, and this was for the most part gaming, pure and simple. The universal diffusion of this gambling spirit is well shown by the fact that even Buffon, writing in 1760 and using the then current phraseology, says: "We may bet one to one that a newborn infant will live eight years; that a child one year old will live thirty-three years more." Further on he says: "The age at which the longest life is to be expected is seven, because we may lay an equal wager, or one to one, that a child of that age will live forty-two years and three months longer." These estimates are said by Walford to be remarkably accurate, but one of Buffon's contemporaries objected to such serious remarks and advised that he keep them for his "book on beasts." Buffon.

The faith in mathematics and in mathematicians must have been prodigious in those days, for one John Craig proposed, in a published work, to convince Jews and convert infidels by means of mathematic formulas. Ridiculous as such enthusiasm over figures may now appear, it must be remembered that, apart from a great deal that was extravagant and useless, great statistical truths were being developed. Proselyting by mathematics.

Curious deductions.

The more the laws of chance were studied, the less did that term appear applicable. It was startling to learn that the number of persons dying in each year might be closely predicted, and still more so to find that the number dying of each disease might very accurately be foretold. It endowed death with new terrors when the statisticians announced that the throb of every second meant to the world the coming of a new life and the departure of an older one. Mothers might well cling more closely to their children when they learned from Halley that barely one-half of all the little ones would live to maturity. To him who hoped to be a centenarian came discouragement in the statistician's statement that his chances were at birth but as 1 against 1000.

Yet all these statements were nearly true, and the mathematicians could even forecast the number of suicides or murders to be committed the year following, and the weapons or other lethal means that would be used.

Many were the quips and jibes in the days of speculative insurance. The first lines at least of the following oft-quoted jingle might apply very well to our own time:

An old stanza.

"By fire and life insurance next
I'm intercepted, pestered, vexed,
Almost beyond endurance.
And though the schemes appear unsound,
Their advocates are seldom found
Deficient in assurance."

"The Lover's Bill of Mortality."

Many will recall Addison's little flings in his essay in "The Spectator" entitled "The Lover's Bill of Mortality," in which he humorously sets forth certain matters explaining the extraordinary mortality of the romance or novel.* But in spite of this humorous treatment of the mortality tables Addison's writings afford ample proof that his noble mind was impressed by the grandeur of their established truths. His most beautiful essay, "The Vision of Mirza," is an allegoric treatment of this very subject; and in another essay, dated January 31, 1711, he says: "A 'Bill of Mortality' is, in my opinion, an unanswerable argument for a Providence. What else could adjust in so exact

"The Vision of Mirza."

*"Musidorus slain by an arrow that flew out of a dimple in Belinda's left cheek." "Wm. Wiseacre, gent, drowned in a flood of tears by Moll Common," etc., etc. Addison, Essay of May 13, 1712.

a manner the recruits of every nation to its losses, and divide these new supplies of people into such equal bodies of both sexes? Chance could never hold the balance with so steady a hand."

Curious insurance.

Some of the forms of insurance during the speculative era were truly remarkable. One company insured against death from drinking Geneva; another, against highwaymen; and others, against divorce, loss of chastity, and lying.

Bogus companies.

Dickens describes one of the bogus companies of a later period in "Martin Chuzzlewit," under the name of the "Anglo-Bengalee Disinterested Loan and Insurance Company," which is not one whit different from dozens of actual companies of the bubble era.

"What," said the secretary, a former tapster at the Lombard Arms, "will be the capital according to the next prospectus?" "A figure of two and as many aughts after it as the printer can get into the same line," is the reply of the chairman of the board. This strongly suggests the West Middlesex * swindle of 1836, which was originated by two sharpers, one of whom had formerly been a journeyman shoemaker and a smuggler, the other a bankrupt tallow chandler. These men offered to the gullible public annuities and life insurance at a rate 30 per cent. lower than that of other companies. Upon this palpably fraudulent proposal they received no less than 200,000 pounds, chiefly from clergymen, half-pay army officers, and gentlemen of leisure. In speaking of this swindle, Walford truly says: "If the disappointment and ruin which this one fraudulent scheme occasioned could be truly depicted, there is nothing in the realms of fiction which could equal it."

The first company, 1698.

The Mercers' Annuity Life Company, founded by Dr. Assheton in 1698, was really the first life insurance company. Though not successful, it furnished genuine mutual life insurance, agreeing to pay to the widow of any subscriber 30 pounds per annum during her lifetime. The premium was represented by a subscription of 100 pounds upon the part of the insured. The Society for the Assurance of Widows and Orphans, also unsuccessful, was founded in 1699, and was followed in 1706 by the Amicable

The Amicable, 1706.

* The West Diddlesex of Thackeray's "Great Hoggarty Diamond."

Province of Pennsylvania, ss.

This Indenture Made this

Twenty second Day of May in the Year of our Lord one

Thousand seven Hundred and Eighty four BETWEEN Francis Alison

in the County of Chester Minister of the Gospel of the one Part, and the Corporation for the Relief of poor and

distressed Presbyterian Ministers, and of the poor and distressed Widows and Children of Presbyterian Ministers

Part: WITNESSETH, That the said Francis Alison

Agreements hereinafter mentioned, on the Part and Behalf of the said Corporation, to be kept

the Benefits and Advantages thereby granted and intended to the Widow and Children of the said Francis Alison

after his Decease, and for divers other good Considerations

and with the said Corporation for the Relief of poor and distressed Presbyterian Ministers

and Children of Presbyterian Ministers

Francis Alison shall and will during the Term of his natural Life

to be paid on the Twenty second Day of May in each Year, the Annuity or Sum of Five

pounds Current Money of the Province of Pennsylvania, to the said Corporation

Order: Where of the first Payment was made on the Twenty second Day of May

That on the Marriage of the said Francis Alison

Francis

Alison shall and will on every such Marriage pay, or cause to be paid

Successors, the Sum of Five Pounds over and above the said Annuity

and their Successors, do covenant, grant, and agree to and with the said Francis Alison

Executors and Administrators, by these Presents, That if the said Francis Alison

and perform in Manner aforesaid, or pay, or cause to be paid unto the said

mentioned during his natural Life, the said Annuity or Sum of

Successors, or Order, according to the true Intent and Meaning of these Presents, then and

said Corporation and their Successors, shall and will the said every Year

Alison well and truly pay, or cause to be paid unto the said Francis Alison

the said Francis Alison the Annuity or Sum of Twenty one pounds

said, during the Term, in the Proportion

in a Plan of Agreement between the Corporation, and the annual Contributors,

In Witness whereof, the Corporation

distressed Widows and Children of Presbyterian Ministers

and Year first above-written.

Treasurer

FIG. 1.—THE FIRST POLICY OF THE FIRST AMERICAN LIFE INSURANCE COMPANY.

Society. But for the first life insurance conducted upon a rational and scientific plan one must look to the Equitable, founded at London in 1762, of which Dr. Holden says, "Its history gives the best selection up to the advent of insurance in America."*

The Equitable of London, 1762.

The Dawn of a New Era.—Walford also mentions it in the following terms: "The year 1762 ushered into existence the Equitable Society and with it a new era in the practice of Life Assurance."†

Early Requirements and Rating.—The Amicable required good health, and the applicant's declaration was supported by oath. The companies of this early period for the most part, however, merely required a personal application to a lay-board, one adverse report rejecting, and for years all insurers, whatever their age or occupation, paid the same premium.

Same premium for all ages.

Grading of Premiums and Employment of Physicians.—As time passed, greater care was exercised, and premiums were graded according to the age of the insurer. In 1762, the date of the founding of the Equitable, a health certificate was required bearing the signature of two witnesses, one of whom must be a physician. In 1779 an actuary suggested the need of a medical adviser. In 1820 the payment of commissions, which thirty or forty years previous to this time had been vigorously attacked as constituting a species of bribery, became a regular feature of the business, and its attendant dangers led to the employment of medical examiners.

Health certificate.

Medical adviser.

Commissions.

Medical examiners.

Holden believes, however, that their employment was more directly due to the development of the science of auscultation and percussion, which served to show very clearly that only the skilled physician could be depended upon to detect incipient or hidden disease.

American Life Insurance Companies.—In America the beginnings of life insurance proper are to be seen in the founding of the still existent "Corporation for the Relief of Poor and Distressed Presbyterian Ministers, and of the Poor and Distressed

Presbyterian ministers' fund, Philadelphia, 1759.

* "Selection of Lives for Insurance," 1888, Edgar Holden: Wood's "Handbook of Medical Sciences."

† Walford, "The Insurance Guide and Handbook," London, 1867.

Widows and Children of Presbyterian Ministers, January 1, 1759." The Massachusetts Hospital Insurance Company in 1818, followed in 1843 by the Mutual Life of New York, by the New England (1844), the State Mutual, Mutual Benefit, and New York Life (1845), and the Connecticut Mutual in 1846.

Medical Selection.—In the American companies selection by medical examiners was practised from the outset, but the physical condition of the applicant was alone considered of importance, family history and past disease being lightly regarded.

It is probable that even this selection was not of the best, for Dr. G. W. Russell has said * of the requirements in the year 1850: "The personal examination was not thorough or minute; the fact that a man wanted to be insured was almost *prima facie* evidence that he ought to be insured, and he was insured."

It was soon found necessary, in the interest of better selection, to appoint regular examiners who would be responsible and competent men, and feel that they directly represented the insurer rather than the insured, as had previously been the case.

Medical referees, 1867.

In 1867 the Mutual Life met this palpable need by the appointment in various localities of medical referees, through whom or upon whose nomination examiners were appointed. Other companies adopted the same measure, and, as showing that this step was of immense importance, it need only be said that "in one State no less than 80% of the former examiners were found to be unqualified."†

So, also, as competition increased, commissions grew larger, and agents became more aggressive, the increased danger to the company was met by a more careful scrutiny of risks and an elaboration of the application blanks.

Urinary analysis was for years neglected, and even to this day a few companies demand it only in event of a certain sum being applied for or in the case of applicants above a certain age.

Such, briefly stated, has been the growth of life insurance since its real foundation, which dates back only one hundred and thirty-six years.

* Eighth annual meeting of the Association of Medical Directors.

† Edgar Holden, "Selection of Lives for Insurance."

Differences in the Selection as Practised by the American and British Companies.—American life insurance companies have from the first worked almost wholly upon a basis of selected lives—that is to say, they have not, as a rule, attempted to insure, nor have they invited applications from, persons who were not in good health, or from those whose family record, personal history, occupation, or habits did not offer a reasonable ground for the belief that they would live to old age. The British companies, on the other hand, insure those that are distinctly below the average in point of health, covering the increased risk either by an added premium, by an arbitrary addition to the applicant's age, or by making early death a lien upon the policy. They will, for example, insure persons having mitral disease of the heart, those having gout or such as have unfortunate antecedents, and attempt to cover the increased risk in the manner described. Fortunately, the results of this form of insurance, with its empirical basis, have in the main been distinctly favorable to the companies.*

The Elementary Principles of Life Insurance.—It is well to explain here what is meant by the frequently recurring phrase, "expectation of life."† If one knows how many of a large group, say, of 100,000 men, will die during each year, it is easy for him to ascertain what will be the probable average duration of the life of its members. The "expectation of life" as now applied to life insurance is the average after-lifetime of a large group of healthy individuals. It has, therefore, no significance as to the individual life, but only to the lives in the aggregate. Furthermore, it is a term of general interest only, and is not a factor in actuarial computations.

"Expectation of life."

The "mean duration of life" represents the quotient obtained by dividing the aggregate ages at death of a large number of persons by the number of lives taken.

"Mean duration of life."

To construct a mortality table showing the "expectation of life," —such a table as that of the combined actuaries, for example,— a certain number of lives of a definite age (let us say 100,000) are taken, and the deaths occurring in each subsequent year are

* See chapter on the Insurance of Substandard Lives.

† "Expectation of life" and the "mean after-lifetime" are equivalent terms.

Probable duration of life.

shown until the original group is exhausted. One can then tell at a glance the "probable duration of life" for any given age. It will always be represented by the difference between the age taken and the age at which the table shows a total loss of one-half of the number surviving at the former age—*i. e.*, if at the age of twenty, 93,000 were surviving, and it were desired to know how long an applicant of that age would probably live, one need only seek the age at which 46,500 only were living, and might find this to be sixty-five. The difference between twenty and sixty-five, or forty-five years, would represent the "probable duration of life." *

ACTUARIES' OR COMBINED EXPERIENCE TABLE OF MORTALITY.

Age.	Number Living.	Number Dying.	Logarithm, Number Living.	Logarithm, Number Dying.	Logarithm, Probability of Dying.	Yearly Probability of Dying.	Expectation of Life.
10	100,000	676	5.0000000	2.8299467	7.8299467	0.006760	48.36
11	99,324	674	4.9970542	2.8286599	7.8316057	0.006786	47.68
12	98,650	672	4.9940971	2.8273693	7.8332722	0.006812	47.01
13	97,978	671	4.9911286	2.8267225	7.8355939	0.006848	46.33
14	97,307	671	4.9881441	2.8267225	7.8385784	0.006896	45.64
15	96,636	671	4.9851389	2.8267225	7.8415836	0.006943	44.96
16	95,965	672	4.9821129	2.8273693	7.8452564	0.007003	44.27
17	95,293	673	4.9790610	2.8280151	7.8489541	0.007062	43.58
18	94,620	675	4.9759829	2.8293038	7.8533209	0.007134	42.88
19	93,945	677	4.9728737	2.8305887	7.8577150	0.007206	42.19
20	93,268	680	4.9697327	2.8325089	7.8627762	0.007291	41.49
21	92,588	683	4.9665547	2.8344207	7.8678660	0.007377	40.79
22	91,905	686	4.9633391	2.8363241	7.8729850	0.007464	40.09
23	91,219	690	4.9600853	2.8388491	7.8787638	0.007564	39.39
24	90,529	694	4.9567877	2.8413595	7.8845718	0.007666	38.68
25	89,835	698	4.9534456	2.8438554	7.8904098	0.007770	37.98
26	89,137	703	4.9500580	2.8469553	7.8968973	0.007887	37.27
27	88,434	708	4.9466193	2.8500333	7.9034140	0.008006	36.56
28	87,726	714	4.9431283	2.8536982	7.9105699	0.008139	35.86
29	87,012	720	4.9395792	2.8573325	7.9177533	0.008275	35.15
30	86,292	727	4.9359705	2.8615344	7.9255639	0.008425	34.43
31	85,565	734	4.9322962	2.8656961	7.9333999	0.008578	33.72
32	84,831	742	4.9285546	2.8704039	7.9418493	0.008747	33.01
33	84,089	750	4.9247392	2.8750613	7.9503221	0.008919	32.30
34	83,339	758	4.9208483	2.8796692	7.9588209	0.009095	31.58
35	82,581	767	4.9168801	2.8847954	7.9679153	0.009288	30.87
36	81,814	776	4.9128276	2.8898617	7.9770341	0.009485	30.15
37	81,038	785	4.9086887	2.8948697	7.9861810	0.009687	29.44
38	80,253	795	4.9044613	2.9003671	7.9959058	0.009906	28.72
39	79,458	805	4.9001376	2.9057959	8.0056583	0.010131	28.00

* It will be noticed that the probable duration of life differs slightly from the expectation of life as shown in the tables.

ACTUARIES' OR COMBINED EXPERIENCE TABLE OF MORTALITY.—*Continued.*

AGE.	NUMBER LIVING.	NUMBER DYING.	LOGARITHM, NUMBER LIVING.	LOGARITHM, NUMBER DYING.	LOGARITHM, PROBABILITY OF DYING.	YEARLY PROBABILITY OF DYING.	EXPECTATION OF LIFE.
40	78,653	815	4.8957153	2.9111576	8.0154423	0.010362	27.28
41	77,838	826	4.8911917	2.9169800	8.0257883	0.010612	26.56
42	77,012	839	4.8865584	2.9237620	8.0372036	0.010894	25.84
43	76,173	857	4.8818011	2.9329808	8.0511797	0.011251	25.12
44	75,316	881	4.8768872	2.9449759	8.0680887	0.011697	24.40
45	74,435	909	4.8717772	2.9585639	8.0867867	0.012212	23.69
46	73,526	944	4.8664409	2.9749720	8.1085311	0.012839	22.97
47	72,582	981	4.8608289	2.9916690	8.1308401	0.013516	22.27
48	71,601	1021	4.8549191	3.0090257	8.1541066	0.014260	21.56
49	70,580	1063	4.8486817	3.0265333	8.1778516	0.015061	20.87
50	69,517	1108	4.8420910	3.0445398	8.2024488	0.015939	20.18
51	68,409	1156	4.8351132	3.0629578	8.2278446	0.016898	19.50
52	67,253	1207	4.8277117	3.0817073	8.2539956	0.017947	18.82
53	66,046	1261	4.8198465	3.1007151	8.2808686	0.019093	18.16
54	64,785	1316	4.8114745	3.1192559	8.3077814	0.020313	17.50
55	63,469	1375	4.8025617	3.1383027	8.3357410	0.021664	16.86
56	62,094	1436	4.7930496	3.1571544	8.3641048	0.023126	16.22
57	60,658	1497	4.7828881	3.1752218	8.3923337	0.024679	15.59
58	59,161	1561	4.7720355	3.1934029	8.4213674	0.026386	14.97
59	57,600	1627	4.7604225	3.2113876	8.4509651	0.028246	14.37
60	55,973	1698	4.7479786	3.2299377	8.4819591	0.030336	13.77
61	54,275	1770	4.7345998	3.2479733	8.5133735	0.032612	13.18
62	52,505	1844	4.7202007	3.2657609	8.5455602	0.035120	12.61
63	50,661	1917	4.7046738	3.2826221	8.5779483	0.037840	12.05
64	48,744	1990	4.6879212	3.2988531	8.6109319	0.040826	11.51
65	46,754	2061	4.6698188	3.3140780	8.6442592	0.044082	10.97
66	44,693	2128	4.6502395	3.3279716	8.6777321	0.047614	10.46
67	42,565	2191	4.6290526	3.3406424	8.7115898	0.051474	9.96
68	40,374	2246	4.6061018	3.3514098	8.7453080	0.055630	9.47
69	38,128	2291	4.5812440	3.3600251	8.7787811	0.060087	9.00
70	35,837	2327	4.5543316	3.3667964	8.8124648	0.064933	8.54
71	33,510	2351	4.5251744	3.3712526	8.8460782	0.070158	8.10
72	31,159	2362	4.4935835	3.3732799	8.8796964	0.075805	7.67
73	28,797	2358	4.4593472	3.3725438	8.9131966	0.081883	7.26
74	26,439	2339	4.4222450	3.3690302	8.9467852	0.088468	6.86
75	24,100	2303	4.3820170	3.3622939	8.9802769	0.095560	6.48
76	21,797	2249	4.3383967	3.3519895	9.0135928	0.103179	6.11
77	19,548	2179	4.2911023	3.3382572	9.0471549	0.111469	5.76
78	17,369	2092	4.2397748	3.3205617	9.0807869	0.120444	5.42
79	15,277	1987	4.1840381	3.2981979	9.1141598	0.130065	5.09
80	13,290	1866	4.1235250	3.2709116	9.1473866	0.140406	4.78
81	11,424	1730	4.0578182	3.2380461	9.1802279	0.151436	4.48
82	9,694	1582	3.9865030	3.1992065	9.2127035	0.163194	4.18
83	8,112	1427	3.9091279	3.1544240	9.2452961	0.175912	3.90
84	6,685	1268	3.8251014	3.1031193	9.2780179	0.189678	3.63
85	5,417	1111	3.7337588	3.0457141	9.3119553	0.205095	3.36
86	4,306	958	3.6340740	2.9813655	9.3472915	0.222480	3.10
87	3,348	811	3.5247854	2.9090209	9.3842355	0.242234	2.84
88	2,537	673	3.4043205	2.8280151	9.4236946	0.265274	2.59
89	1,864	545	3.2704459	2.7363965	9.4659506	0.292382	2.35

ACTUARIES' OR COMBINED EXPERIENCE TABLE OF MORTALITY.—*Continued.*

AGE.	NUMBER LIVING.	NUMBER DYING.	LOGARITHM, NUMBER LIVING.	LOGARITHM, NUMBER DYING.	LOGARITHM, PROBABILITY OF DYING.	YEARLY PROBABILITY OF DYING.	EXPECTATION OF LIFE.
90	1,319	427	3.1202448	2.6304279	9.5101831	0.323730	2.11
91	892	322	2.9503649	2.5078559	9.5574910	0.360987	1.89
92	570	231	2.7558749	2.3636120	9.6077371	0.405263	1.67
93	339	155	2.5301997	2.1003317	9.6601320	0.457227	1.47
94	184	95	2.2648178	1.9777236	9.7129058	0.516304	1.28
95	89	52	1.9493900	1.7160033	9.7666133	0.584270	1.12
96	37	24	1.5682017	1.3802112	9.8120095	0.648649	0.99
97	13	9	1.1139434	0.9542425	9.8402991	0.692308	0.89
98	4	3	0.6020600	0.4771213	9.8750613	0.750000	0.75
99	1	1	0.0000000	0.0000000	0.0000000	1.000000	0.50

The betting odds on any age.

To ascertain the chances that a man would not die within a specified time,—a matter of importance in the days of betting and speculative insurance,—it was only necessary to refer to the mortality table and subtract the number living at the given age of the individual from the number living at the age to be reached under the terms of the wager and divide the latter number by the difference—*e. g.*, if one desired in those days to know the proper odds on the probability that a certain individual would live ten years, and his age were forty, by reference to Halley's table he would find 445 living at forty and 346 at fifty; the difference being 99, the odds would be 346 to 99 that the party would not die within ten years, or about 3½ to 1.

Simple method of calculating the "expectancy."

In practical life insurance the question of life expectancy is sometimes reduced to a very simple proposition, for in order to *roughly* ascertain the expectation of life, one has simply to deduct the figures representing the man's age from 80, two-thirds of this remainder representing the number of years that he has yet to live—that is to say, the expectation of life equals two-thirds of the difference between the applicant's age and 80. This is very inaccurate when applied to older lives. Another amusing but extremely inaccurate "agent's method" of ascertaining the probable lifetime of an elderly applicant is to add together the ages at death of the deceased parents and grandparents, and divide by six, the quotient representing the probable age which the particular individual will attain. The last method is mentioned only to condemn it as absurdly inaccurate.

An absurd method.

Even though he be not versed in actuarial science, one can easily understand that if the foregoing facts be established, it becomes an easy matter to arrange for an annual payment by each member of a large group of men who become mutually bound to contribute to the payment of a fixed sum to the heirs of deceased members of the group. Such is insurance in its simplest form, and there are innumerable variations. Fraternal insurance, for example, usually provides for a direct assessment levied on each member of the group whenever a death occurs, the amount assessed being sufficient merely to cover expenses of management and meet the death losses as they occur. It is assumed by such companies that the admission of new members from year to year will compensate for the loss of old ones, and by diluting the membership and reducing the average age keep the cost per member at a reasonably uniform figure.*

Fraternal orders.

Other kinds of assessment insurance provide for an assessment at stated times, by which it is intended to collect the amount necessary, not merely to discharge the death losses and provide for the expense of management, but also to permit of the formation of a fund that may be drawn upon at any time should the death losses reach unexpectedly large figures.

Assessment companies.

"Old line" insurance provides for all these things, and in addition contemplates the establishment of such a fund as will insure the payment of every member when his claim matures even should the company cease doing new business at any time.

Level premium.

It is neither necessary nor proper to attempt to discuss here the manifold variations in the forms of policies, much less to point out the merits or demerits of any particular system of insurance. Absolute safety with the greatest economy is the fundamental principle.

Life insurance is really based upon a few very simple formulæ, though its variations in practice are so diverse and complex as to raise many special problems and make actuarial science one involving the most elaborate calculations.

It may not be out of place to state the elementary principles, inasmuch as they seem to be but little understood by the laity or by medical examiners.

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*See New Blood," p. 30.

Example.—Assuming (1) that a certain number of individuals desire to make provision for their families in event of their death. (2) That each is willing to pay annually such a sum as will at once create and afterward maintain a fund sufficient for this purpose. (3) That, for purposes of convenience, a company is organized to receive the individual subscriptions, and to make the required payments to the families of deceased members. It follows then—

(*a*) That the company becomes "the insurer."

(*b*) That the subscribers are "the insured."

(*c*) That the family represents the "beneficiary."

(*d*) That the individual subscription represents "the premium."

(*e*) That the contract which guarantees the payment of a fixed sum to the beneficiary represents the "policy."

(*f*) That the sum to be paid the beneficiaries represents the "amount insured."

It now becomes necessary to determine—

1. The amount to be paid to the beneficiary.

2. The additional amount necessary to provide for the expense of the maintenance and operation of the company. This constitutes the "loading for expense."

3. The amount necessary to be carried on hand from year to year to meet death losses as they occur, or to be put aside and invested to meet the inevitably greater loss of the later years of insurance. This constitutes the "reserve." The reserve is unexpended net premium.

Illustration.

Suppose, for the purpose of illustration, one uses the following example, based upon one contained in that valuable manual of Willard, "The A, B, C of Life Insurance": It is assumed that the number of men desiring to insure is 1000, that each is forty years of age, that each is insured for $1100 and remains insured until death.

From a mortality table one might learn the exact number of such a group likely to die in each year, but to simplify matters it may be assumed that ten years is the maximum life and that the expected loss is 100 deaths per year—both purely fictitious suppositions. It is clear that the company's total obligation is represented by the amount guaranteed each member at death multiplied by the number insured ($1000 \times \$1100 = \$1,100,000$).

The company may suppose that this obligation will fall due in an orderly manner, and has apparently ten years in which to collect the sum, but as it is losing its paying members at the rate of 100 per year, the actual number of payments made by the insured to the company will be, not 10,000, but only 5500.

Each equitable and necessary payment must then inevitably represent the quotient obtained by dividing the amount insured—viz., $1,100,000—by the total number of payments to be anticipated, and it is found that $1,100,000 divided by 5500 equals $200. This sum is the premium or annual payment to be required of each member to pay death losses. Premium.

The company would collect, therefore, the first year from each member $200 ($200 × 1000, or $200,000) premium, and pay out to the beneficiaries of 100 deceased members $110,000 (100 × $1100) death losses, leaving a balance of $90,000 to be put aside for reserve.

The second year it would receive from the 900 survivors only $180,000, and paying, as before, $110,000 in death losses, its balance would be for that year only $70,000, which, added to that of the first year, would give a total excess of collections over loss equal to $160,000. But at the beginning of the sixth year it would receive but $100,000 in premiums with which to pay $110,000 of death losses, and, from this time on, the accumulated reserve of the first five years would be required to meet the deficit created by the shrinking premium receipts of the later years. "Reserve."

As it is assumed in this case that there is equality of age and in the amount insured, it would be found that at the end of the tenth year the company could exactly discharge its obligations.

The "insurance cost" of any year is represented by the sum obtained by dividing the death losses of that year by the number of men living at the beginning of the year—for example, the losses of the first year, $110,000, divided by 1000, gives $110 per man as the actual cost for the first year. Insurance cost.

In the sixth year losses are the same, $110,000; the number of men paying, only 500; $110,000 divided by 500 equals $220, and it is evident that the actual cost per man has doubled. It is also clear that in any such group the cost steadily increases from year to year by reason of the aging of the lives at risk,

and that the accumulated balance of the first years of low cost forms "the reserve," which is relied upon to secure the payment of the losses of the later years of excessive cost.

In actual insurance the problem is much more complicated, though the principle remains the same. Thus:

(*a*) The premium must be loaded to cover cost of operation.

(*b*) The policy holders will be of varying ages.

(*c*) The reserve will be accumulating and compounding interest.

"New blood." (*d*) The yearly increase in new members will materially modify the proportionate gross death loss, although *in the whole group it does not actually affect or modify the mortality rate for each age.*

Yet, despite this tremendous complication, the actuary can determine accurately the amount necessary to be collected from each policy holder, no matter what his age or what the form of his policy. He can, in fact, forecast the yearly mortality and make his company safe and sound if the medical examiner has done his duty and if his company is operating upon the one safe basis—viz., proper selection of its risks.

The Necessity for Medical Selection.—The old companies at one time did without medical examinations, and simply demanded a certificate of health and an appearance before the lay board.* Even now, indeed, one may hear it said that selection by physicians is unnecessary, and that one may go into the streets of any city and insure the passers-by with safety; one may also, occasionally, meet an insurance agent who believes that he can "size up" an applicant quite as well as the physician.

Both contentions are utterly erroneous. The very fact that the risks chosen by the objector would under this proposition be active, busy men residing in a respectable part of the city would of itself argue a very good average of health; but to assume that even this haphazard selection would prove favorable has little weight as an argument, as it is highly improbable that applicants presenting themselves for insurance would be of an equally good class.

Some of the most serious diseases do not for years affect un-

*"The Amicable" continued this arrangement until 1855.

favorably the applicant's outward appearance. If mere selection by a lay board were practised, the most absurd errors would occur, many good risks would be rejected, bad ones accepted, and the sum total would be a sorry lot. Healthy men seek insurance somewhat deliberately, but the unhealthy rush for it when they think there is a chance of passing the physical examination. In short, only with proper selection can a company operate with safety to itself and economy to its members, for the laws of mortality are as fixed as the laws of gravitation.

Deceptive outward appearance.

Statistical Proof.—The value of the medical examination and of careful selection is well demonstrated in the following table, constructed by Bloomfield L. Miller, Actuary.*

TABLE SHOWING EFFECT OF SELECTION.

Includes: Experience of Mutual Life from 1843 to 1873 inclusive.

Experience of Connecticut Mutual (males) from 1846 to 1877 inclusive.

Experience of Mutual Benefit from 1845 to 1887 inclusive.

Year of Membership.	Probable Deaths. Am. Exp.	Actual Deaths.	Ratio of Actual to Probable † Deaths.
First,	1,904.52	1,216	0.638
Second,	2,510.60	1,773	0.706
Third,	2,255.40	1,700	0.754
Fourth,	2,096.79	1,724	0.822
Fifth,	1,963.75	1,660	0.845
First to fifth,	10,731.06	8,073	0.752
Sixth to tenth,	7,762.04	6,753	0.870
Eleventh to fifteenth,	5,070.54	4,391	0.866
Sixteenth to twentieth,	3,556.08	3,107	0.874
Twenty-first to twenty-fifth,	2,350.04	2,149	0.914
Twenty-sixth to thirtieth,	1,043.30	951	0.912
Thirty-first to thirty-fifth,	372.67	342	0.918
Thirty-sixth to fortieth,	276.80	253	0.914
Forty-first to forty-third,	61.04	54	0.885
Sixth to forty third,	20,492.51	18,000	0.878
First to forty-third,	31,223.57	26,073	0.835

One of the most interesting illustrations of the value and effectiveness of medical selection even in industrial insurance—a

* "Proceedings of the Actuarial Society of America," vol. I, p. 75.

† Having in mind the comparatively lax selection of earlier years, this is a remarkable showing.

class of business in which medical examinations are of necessity somewhat loosely conducted and ill paid—has been furnished by Dr. Hamill, Medical Director of the Prudential Insurance Company of America.

The following tables were constructed by Mr. Walter S. Nichols to illustrate his discussion of Dr. Hamill's article.*

Dr. Nichols says:

"Applications for additional insurance in the company, which had been refused after a medical examination, on account of impaired lives, between the years 1888 and 1892 inclusive, were noted to the number of 13,042, and their after lives were followed by means of the prior existing policies in force in the company. The total number of deaths observed among them to May, 1893, was 1632. The distribution of the figures is shown in the following table:

Year.	Number of Cases Rejected.	Subsequent Deaths.	Year in Which Death Took Place and Number.					
			1888.	1889.	1890.	1891.	1892.	1893.
1888, . . .	1,175	309	21	78	63	63	65	19
1889, . . .	2,454	397	...	54	135	89	94	25
1890, .	2,710	420	...	...	68	176	148	28
1891, . . .	2,478	311	...	...	...	83	185	43
1892, . . .	4,225	195	...	...	...	...	118	77
Total, . .	13,042	1,632	21	132	266	411	610	192

"The death-rates of the rejected risks, during successive years of insurance, are shown in the following readjustment, which I have made of the first table above, omitting the fractional portion of 1893:

Policy Year.	Number of Rejections Observed on.	Number of Deaths.	Percentage.
0, ...	13,042	344	2.64
First, ...	8,591	574	6.60
Second, ...	5,807	300	5.17
Third, ...	3,189	157	4.92
Fourth, ...	950	65	6.84

The last column should be compared with the death-loss on accepted—*i. e.*, *selected*—lives, as shown in the last column of the next table.

*"Proceedings of Actuarial Society of America," vol. III, p. 225.

"No allowance has been made in these figures for lapses, which must increase the above death-rate more or less with each successive policy year."

"Now, a comparison with the general death-rate of the company will show the significance of the figures. I have computed the following table from the official returns of its business to the departments:"

Year.	Mean Number of Policies in Force.	Number of Claims.	Percentage of Claims.
1888, ...	793,812	13,355	1.68
1889, ...	976,065	15,588	1.60
1890, ...	1,166,378	21,334	1.83
1891, ...	1,295,994	23,683	1.83
1892, ...	1,506,924	27,857	1.85

The benefit of selection is necessarily best shown in the case of tuberculosis or of heart disease, because in life insurance examinations, both the applicant's physical condition and his family history are carefully scrutinized with especial reference to pulmonary and cardiac disease.

The following extract from tables in Dr. Symond's article admirably illustrates this point: *

Years Insured.	Tuberculosis: Actual Deaths to 100 Estimated.	Years Insured.	Heart Disease: Actual Deaths to 100 Estimated.
	Per cent.		Per cent.
0 (six months), .	9.97	0 (six months), .	21.59
First, ...	26.72	First, ...	44.49
Second, ...	52.21	Second, ...	62.63
Third, ...	58.27	Third, ...	68.16
Fourth, ...	56.91	Fourth, ...	82.72
Fifth, ...	55.94	Fifth, ...	58.02
Sixth, ...	67.79	Sixth, ...	89.83
Seventh, ...	63.20	Seventh, . . .	76.38
Eighth, ...	58.28	Eighth, ...	93.24
Ninth, ...	60.93	Ninth, ...	79.03

For another interesting illustration of the benefit conferred by medical selection the author is indebted to Dr. Geo. R. Shepherd, who writes as follows:

"Regarding the matter of selection of risks, I venture to in-

* Brandreth Symonds, "Medical Jurisprudence of Life Insurance." Hamilton's "System of Legal Medicine," p. 512.

close you a condensed table from our experience, being the first 25,000 deaths in the experience of the Connecticut Mutual Life Insurance Company, 1847 to 1894, as regards *consumption.*

First	5,000 deaths, ...	1847 to 1873,	997
Second	5,000 deaths, ...	1873 " 1880,	853
Third	5,000 deaths, ...	1880 " 1885,	508
Fourth	5,000 deaths, ...	1885 " 1890,	379
Fifth	5,000 deaths, ...	1890 " 1894,	272

"The above shows very markedly the beneficial effects of selection as it has gradually developed during the last fifty years. Some allowance, of course, must be made for improved methods of treatment in consumption, and care of those afflicted with the disease, thus diminishing the mortality, but the great improvement in our company's mortality was undoubtedly due to wise selection."

Naturally, the chief benefit of selection is shown during the first five years, but there can be no doubt that it is really acting throughout the whole term of insurance, and this is doubly true in the case of rejections based upon family history, which may in many instances make apparent their good effects only after the lapse of many years.

From this brief sketch it will readily be seen that life insurance is, at its worst, a simple gambling venture; at its best, a great trust, whose proper discharge is guaranteed by scientifically devised premium tables based upon natural law, and enforced by the strong arm of State and nation.

In the United States on January 1, 1899, the level premium companies reported business representing a total insurance in force of $6,825,037,770; and the assessment companies and fraternal orders, an amount stated as $7,779,428,000. In short, nearly 15,000,000 policies were then in force, and $14,624,465,770 is the stupendous total. Nearly every dollar of this great liability represents the opinion of members of the medical profession. Here lies the medical examiner's responsibility. If he does his duty, the company, if properly organized, is safe; if he fails in that duty, he can not but wreck the great and beneficent machine, bring tremendous losses upon innocent policy holders, and ruin and desolation to thousands of homes.

THE MEDICAL EXAMINER AND HIS PROBLEMS.

Personal Qualifications.—The physician who accepts an appointment as examiner for an insurance company assumes a delicate and responsible duty; one that demands not only a proper training in diagnostic technic and the elements of etiology and prognosis, but also a great amount of tact, knowledge of human nature, natural shrewdness, and, over and above all, that absolute incorruptibility, unflinching honesty, and deep sense of moral obligation, which are the best vouchers for moral courage. Lacking the latter qualifications, a physician must necessarily be a most unsatisfactory examiner, however great his professional skill.

Their diversity.

The General Attitude of the Examiner.—The medical examiner must of necessity be mentally alert and quick to detect imposition or imposture, but never should he betray suspicion by word or look or by a brusque mode of putting his questions. He must, in short, cultivate the manner and methods of the diplomatist, and achieve his ends by a never-failing courtesy combined with firmness and decision. It is, in short, one of the many situations to which is applicable the old saying concerning the "iron hand in the velvet glove."

Dangers.—A physician acting in this capacity must be prepared to meet occasionally with deceit, misrepresentation, cajolery, browbeating, and, hardest of all, misrepresentation and misunderstanding.

Responsibility.—He is the representative of the medical department of the company employing him, one of the many watchdogs set to guard the interests of the policy holders, and should never lose sight of this fundamental fact. He most emphatically is not the representative of the agent, nor of the man seeking insurance, but stands first and last for the safety of the company.

Represents the medical department.

The Mental Attitude of the Examiner.—At the outset it is imperative that the physician should adopt a correct mental attitude, and this demands a knowledge of the "company's" point of view.

Patient *vs.* applicant.

Usual Attitude Reversed.—In ordinary practice the presumption of ill health is uppermost; in life insurance work the applicant is presumptively sound. In the one case the physician starts out with a known abnormal, in the other with a presumptive normal. His mental attitude is thus reversed, and the importance of a neglected branch of study, that of the normal body, is strongly emphasized. Speaking broadly, nine out of ten patients are diseased, and nine out of ten "applicants" are healthy.

Longevity the vital point.

The insurance companies consider, primarily, longevity, and realize that long life in the group must depend upon careful selection of the individuals composing it, and that the duration of any life depends upon race, morals, occupation, habits, environment, family history, medical history, and the physical condition.

The insurance examiner should not focus his attention upon minor defects to the exclusion of the specific and vital question, "How long will this man or woman live?" Neither should he permit himself to approve a poor risk because of the faulty assumption that one, though likely to fall short of old age, will be of no consequence in the vast number of better risks secured. If such an attitude prevail, the poor risk becomes one of a thousand such, and the company's treasury suffers in consequence.

Nor does the primary presumption of good health in the applicant relieve the examiner in the slightest degree of the necessity for making a thorough and careful examination. It merely adds to his difficulties by removing from his field of view the sign-posts of established and admitted disease.

Average "Good Health" vs. "Average Health."—The companies do not demand physical perfection; but they do demand *average good health*, not, be it noted, "average health."

The insurance normal.

The insurance normal is a somewhat intangible and elusive quantity, varying within certain limits according to the differing opinions of the various medical directors, but it represents

always good health and the promise of long life. This insurance normal is adapted to the requirements of the cheapest plans of insurance, but medical officers are enabled, through the issuance of various more profitable forms of policies, to exercise, at their discretion, a certain amount of liberality and safely cover impairment of minor degree. Beyond this point medical selection becomes a matter of special rating under the various "substandard" plans.

The medical examiner must, therefore, present to these officers in each and every case, whatever be the form of policy desired, the essential *facts*, and this task is both difficult and exacting.

Scylla and Charybdis.

He must hold his course steadily between the Scylla of hypercriticism on the one hand and the Charybdis of careless omission upon the other. Some examiners apply a mental magnifying glass to every trifle, others fail to recognize the real importance of the seeming nonessential. He who can avoid both dangers will not lack appreciation, and such excellence can be attained only by a careful study of insurance requirements combined with thorough professional knowledge and hard common sense.

Decisiveness.

Another quality that should be cultivated is decision. Whenever possible, the examiner should make a plain, positive, and direct report.

It is to be hoped that the reporting of facts affecting longevity rather than of opinions as to insurability will, in the future, be the rule as it is now the exception.

The Application Blank.—If one examine any life insurance application blank, he finds it nothing more than a carefully prepared and unusually elaborate case history sheet; one, in fact, that asks, in a most direct and pointed manner, questions relating to the age, sex, residence, and occupation of the person seeking insurance. The applicant is further questioned as to his past and present habits in regard to the use of stimulants and narcotic drugs, cross-examined as to past illnesses and their results, and is made to go into the question of family mortality through three generations.

The Physical Examination.—Then follows the medical examiner's report upon the results of the physical examination, the questions covering the condition of all important organs and particularly those of the chest. It thus becomes evident that

More than mere case-taking.

life insurance involves case taking, and that a study of the former must necessarily include the latter. *The converse is not true, for the medical side of life insurance forms a special department involving the use of methods and the solution of problems peculiar to itself, and a lack of special knowledge or training operates as a handicap to the physician and makes impossible the best service on his part.*

No apology will be offered for devoting a few pages to a more detailed consideration of the medical examiner's duties and responsibilities, and a reference to those common and natural mistakes that so seriously interfere with the prompt despatch of business or result in undeserved loss to the insurance solicitor and the rejection of good risks.

Selection of Examiners.—The best insurance companies choose their examiners with great care, and although handicapped in most instances by the fact that personal selection by their medical officers is impossible, are reasonably successful in obtaining the services of representative medical men.

Medical Referees.—In States remote from the home office they depend usually upon certain physicians of large acquaintance who are appointed to serve as medical referees, and *to nominate*, at the request of the medical director,—or, in emergency, that of the company's general agent,—such physicians as may be thought well fitted for this particular service.

They may also be asked to pass upon the professional qualifications of physicians who have been used in emergency or to report upon the moral and professional standing of appointed examiners concerning whom the company is in doubt. This nomination is only the first step; the second consists of a thorough investigation of the proposed examiner's standing—moral, financial, and professional—through other confidential sources. Companies usually prefer men who have practised for at least two years, and some demand five; but owing to the direct advantage afforded by modern laboratory training, the younger men are at present looked upon with more favor and given a shorter period of probation.

Agents lack power to appoint.

All this proving satisfactory, the *examiner is, or should be, formally notified of his appointment.* It would be well if the physician would note this fact and avoid the common error of

supposing himself to be a regularly appointed examiner because he has been allowed to complete a few examinations or has perhaps been told by an insurance agent that he is on the list. He should see that his assurance upon this point comes from the home office, and ought not to be led to take insurance that he does not need or desire upon the agent's promise of an appointment coupled with the statement that future examinations will take care of the premiums.

Blanks, Etc., Forwarded.—When he has been appointed, he will receive not only a notification, but blank examination forms, and usually a set of the instructions issued by that particular company. The instructions should be carefully read and filed in some convenient place.

Evils of Multiple Appointments.—One chief examiner and one alternate are usually chosen for each town, and removal to another location forfeits an appointment. In large cities a greater number may be required, but the appointment of the *smallest number consistent with efficient service should be the invariable rule*. A failure to observe this rule is deplorable, tending as it does to throw the work into the hands of the most superficial examiners and, by attenuating fees, diminish the interest taken by the several examiners in their work. He who receives from a company a thousand dollars a year in fees will render more willing and efficient service than he whose revenue from such a source is trivial and intermittent.

Unjust and unsafe.

Support of Home Office.—All companies expect their examiners to be absolutely loyal, and invariably assert that they may act fearlessly in all cases, because the medical department stands by and protects them. It is greatly to the credit of the members of the medical profession that they do render such service, for the promise is not in all respects fulfilled, nor can it be, if an agent be permitted to choose any one of many examiners to do his work. The most conscientious and skilful examiner may thus suffer punishment for good work. Some of the best companies appoint but one or two physicians for any town, and insist that those and no others shall be used, save in a real emergency; the majority appoint from three to a dozen or twenty in a large city, and as a result the agent is enabled to select the men who are most pliant and least exacting, or whose

Dangerous methods.

liberal attitude best suits his ideas as to what constitutes fitness for insurance; the others are practically out of commission. This unsafe procedure should be done away with by such insurance companies or else the mythical promise of protection should be left out of their literature.

For such companies as write substandard risks, an amendment of the old methods becomes absolutely necessary, and all companies accepting such business will have to do as a few do at the present time—namely, make the demands of an aggressive agency department secondary to the requirements of a safe and proper selection of risks.

The Great Problem.—Having received his appointment the examiner is ready to begin work, and is at once brought face to face with a most interesting and difficult problem—namely, how to suit the agent, the applicant, and the company at the same time. It is indeed difficult, and one may derive comfort from the assurance that its solution is at times impossible. All risks offered are not good ones, and both agent and applicant must often be disappointed, if the safety of the company be considered.

Conflicting interests.

Disgruntled Examiners.—The best examiner will often be astonished and disappointed to learn that risks which he has recommended as first-class have been ruthlessly rejected by the medical director of the company. *Only a small percentage of the rejections made by an insurance company are those of the local examiner,* but he should not assume that adverse action indicates a disbelief in his honesty or capacity. The medical director is absolutely without bias, save that which inclines him to the side of safety, and is in possession of a special knowledge of mortality statistics and rules of selection that is not accessible to an examiner. Furthermore, he has at his command important sources of confidential information and means of special inquiry. No agent should be able to report to his home office that this or that examiner has become disgusted, disheartened, and embittered by the evident lack of confidence shown or even to report specific criticisms aimed at the head of the medical director. Such an attitude is most unfortunate and quite futile and unnecessary. The medical director may, and doubtless does, occasionally err; but it is almost always on the side of safety, and

Rejections.

Attitude of medical director.

his knowledge, study, and experience in the field of life insurance work make his opinion one that must be respected even when adverse. The examiner *sees* the individual case, and therein lies his sole advantage over the medical director who deals with thousands; the examiner may believe that a trifling flaw in the past health record, physique, habits, or family history of an applicant will not shorten his life, but the medical director can prove by actual recorded experience that if a group of such risks were placed upon the company's books, the mortality of its members would invariably exceed that expected loss upon which premium payments are based. The moment an examiner becomes antagonistic to his medical department his usefulness to the company ceases.

What the Medical Director Requires.—In a personal letter Dr. Thomas H. Gage says: "What I desire always to impress upon examiners is the vital importance of a clear, full, and accurate statement of all facts bearing upon an applicant's insurability, not only with regard to things inquired about in the form, but with regard to many others which may come within his knowledge. It is not so much the *opinion* of the medical examiner that a medical director wants, however valuable that may sometimes be, it is *facts* upon which he [the medical director] may base *his* opinion."

Facts *vs.* opinions.

As an illustration of this fact it may be said that one of the large old line insurance companies rejected in a certain year 1803 applications. Of these, only 397 were declined by the local examiners.

The Agent.—The general agents of the better class of insurance companies are usually selected men, and represent the best element of the business community. The insurance solicitor is always an object of interest and solicitude to an examiner. As a class, field agents deserve to rank high as representative men. The typical solicitor is a student of human nature, and has a bright, alert, shrewd, diplomatic, and forceful character. He is after business, and it follows that he wants his applicants to be accepted. Being human, it is impossible for him to avoid placing his interest well to the front, and he will naturally try in every way to make the examiner's point of view correspond to his own. In the case of the honest agent the

Natural bias.

safety of the company is always prominent, and he will resort to no improper methods to secure the acceptance of undesirable business. With a dishonest agent it is quite otherwise, and he will stop at nothing to get his risks accepted. Such a man will attempt to influence the examiner's judgment, will want unfavorable features in the application suppressed, insist upon being present while the examination is being made, attempt to hold out an unfavorable report, or may even become a party to direct fraud, such as the substitution of a healthy for an unsound man or the furnishing of a healthy urine in place of one showing albumin or sugar. Such men do not last long, for their company finds them out and they seek new fields, but the examiner will be continuously subjected to the more insidious influences just mentioned, and must always jealously guard his right to independent judgment and yield absolute obedience to the company's rules. He must, in fact, achieve the "golden mean" between excessive sympathy and actual antagonism—either of which is inimical to the company's interest.

The dishonest agent.

The Agent's Rights.—The agent has certain rights that must be respected. He is entitled to a prompt response to his requests for examination, and a physician must either be prepared to act expeditiously in these matters or to surrender his appointment.

Prompt service.

Reasonable Accommodation.—In certain cases the examiner will be asked to make examinations outside of his office and at inconvenient hours. He should try to meet all reasonable requests with courtesy and promptness, for the agent's commission, may, and often does, depend upon a prompt completion of the contract. The better the agent, the less likely are these extraordinary services to be frequently required. It is usually possible for him to bring his applicants to the doctor's house or office, or to arrange an appointment at an hour suiting his convenience.

There should always be a perfect understanding between the agent and the examining physician as to the manner in which such appointments shall be made. The agent should know at just what times the doctor is free to do outside work, and what hours are the most desirable for office appointments. If possible, he should, whenever he takes an application, at once telephone

Appointments.

the examiner and let him and the applicant make their own appointment; thus made, it is much more likely to be kept.

A doctor can not be expected to leave a consultation room, full of patients, to make an outside examination, but it is absolutely necessary that he give applicants with whom he has made an appointment prompt attention. Even if none has been made, he will generally find it necessary to give insurance applicants preference over patients. They are indifferent waiters, and are often but half persuaded and glad of an excuse to avoid their obligation. The agent knows very well that when his applicant is allowed to go home at night unexamined, the chances are good that he will find in the arguments of wife, friends, or rival agents some good excuse for backsliding. Examiners do not always appreciate this phase of the question, and thus commissions are lost and friction is developed.

Backsliding applicants.

Antagonistic Examiners.—It need hardly be said that the examiner should not do or say anything to obstruct the completion of the contract. He need not be an advocate, but he certainly should not act or speak in a way to cast any doubt upon the character of the insuring company, its policy, or the advisability of the contemplated action. In violating this obligation an examiner completely loses sight of his true function, which is solely to determine for his company the question of the applicant's insurability.

He should never permit himself to become an advocate of any one company or system of insurance, for if he be such, the agent of a rival company can not regard him as one likely to afford proper service.

Strict neutrality necessary.

Careful Work.—The agent may, further, properly demand that an examination be carefully made and that no injustice be done an applicant by hasty judgment or a failure thoroughly to sift facts, which, if unexplained, may jeopardize the interest of the insurer. He will also feel aggrieved if by careless work an extended and time-consuming correspondence with the home office is necessitated.

Omissions.—Many a rejection results from a failure to state fully all facts relating to the personal or family history of an applicant, and many a commission has been lost because of the delay due to the resulting correspondence.

Unexplained "trifles."

Nothing Taken for Granted by Medical Director.—The medical director takes nothing for granted, and that which to the physician appears but a trifle may, if unexplained, lead to rejection. It is assumed that when an application is completed, it represents the best knowledge of the case obtainable by the examiner.

Before leaving this part of the subject it may not be amiss to touch upon an error sometimes committed or contemplated by an uninstructed examiner.

Division of Commission or Fee.—The physician should never make any arrangement with an agent by which he receives a part of the examination fee or the examiner a percentage of the agent's commission. In the first place the physician makes an unnecessary, unethical, and degrading bid for patronage; in the second, he is simply getting a bonus on accepted risks. Either arrangement, if known to the medical officers of the company, would forfeit an appointment. Indeed, the objections are so obvious and the procedure so evidently opposed to good morals that one feels constrained to offer an excuse for mentioning the matter at all; this is to be found in the humiliating fact that inquiry as to the propriety of such arrangements was recently directed to the editor of an insurance journal by a practising physician.

Rejection a serious matter.

Duty to Applicant.—A word must also be said regarding the examiner's duty to the applicant. It is a serious matter for any man to have his application for insurance refused. He, as a rule, is attempting to carry out a sacred and unselfish duty, at what may perhaps be a great personal sacrifice. He seeks to guard the interest of those dependent upon him for a support that may at any time be terminated by death. Once rejected he is tabooed, and will experience the greatest difficulty in securing insurance elsewhere. He is entitled to a careful and conscientious examination and a fair and full presentation of all facts affecting his insurability.

The examiner will, in this connection, find serious difficulties presenting themselves from time to time, and his tact will be put to a severe strain. Personal friends, old patients, influential citizens, may become his enemies by reason of his unfavorable action upon their applications; but this must not deter him from exercising his proper function and doing his whole duty.

It may not be amiss to refer to the mistaken attitude so frequently assumed by the family physician of a rejected applicant. Much of the injury done examiners results from the failure of the family attendant to support and justify an adverse opinion even when he knows it to be correct. This is manifestly unjust, and the members of the medical profession should consider the rights of their brethren to support in this matter quite as they would in ordinary consultation work.

The attitude of the family physician.

Minor Faults That May Become Major.—There are many apparently trivial matters that may, if improperly handled, assume unexpectedly large proportions. It should be remembered that all applications are to be written in *ink*. *All* questions are to be fully answered, *no blank spaces left unfilled*, and *no ditto marks used*. *If a correction be necessary, the examiner's signature or initials must be attached as evidence* that the correction is his own and not the result of some improper or dishonest effort to amend the application. *The date* should invariably be that of the examination, and under no circumstance should he yield to an agent's request that it be antedated a few days to save the applicant a little additional premium. This is a matter that the agent must arrange with his agency department at the home office.

The *handwriting upon the medical report must be that of the examiner*, and he can not under any circumstances sign as his own a report covering an examination that has been made by another person, however competent he may believe him to be.

He must *under no circumstance examine a relative* or a person in whose acceptance for insurance he has a pecuniary interest. *He can not act both as examiner and agent*, and, as before stated, should enter into no pecuniary arrangements with any agent that could influence his work as an examiner in the slightest degree. One of the many just grievances of agents is the *carelessness of examiners*, as shown by their failure to bring a *bottle for the urine*, a *measuring tape*, or even an *application blank*.

Some companies will not permit a man to examine a member of a family of which he is the physician, but this is perhaps an overprecaution and an undue hindrance to the life insurance solicitor. It is, nevertheless, sound in theory, and the conscien-

Examinations by family physician.

tious examiner will in the end be better off if he does not examine his own patients.*

It is a good plan to *keep a brief record of all cases* examined, which should include the leading features. Excellent books may be obtained for this purpose.

Fees.—The *fee* for examination is, in the case of most companies, *paid* either *from the home office direct* or through a responsible general agent; it varies from three to five dollars, with an extra fee for microscopic examination when this is required. Fraternal orders pay a smaller fee in most instances.

Special services, drives, and similar extraordinary work must usually be a matter of prearrangement with the agent.

Life insurance fees are *small, but they are sure* in the case of reputable appointments.

The man who accepts an appointment and then complains of the fees paid, he who talks of making $3.00 examinations for one company and $5.00 examinations for another, meaning that his services are graded according to his fees, is quite outside the pale. The examiner's work must be his best in any case, and if he be dissatisfied with the fee, he should refuse the appointment. "The laborer is worthy of his hire," and the author is far from believing that the highest fees paid are adequate or commensurate with the value of the service rendered; but it is difficult to understand how the man who examines for lodges for a fee of one or two dollars can consistently complain of the three- or five-dollar fee of other companies. So long as physicians are content to *practise* upon the basis of insufficient charges they can expect no change. Insurance companies will certainly not pay larger fees until the body of practitioners set a higher value upon *all* services rendered.

Futile criticism.

Unless his companies send him their check monthly without requiring a bill, the examiner should present his statement promptly on the first day of each month. He will find that there is a marked difference between ordinary accounts and those against insurance companies in the matter of collectability.

Examinations Should be Made in Private.—No person other than the applicant and the examiner should be present or

* In small villages such a rule is impracticable.

within hearing during an examination save that the mother may be present in the case of unmarried women.

Temporary Indisposition Invariably Postpones.—The application of one who is suffering from any indisposition, however trivial, should not be sent forward. In such a case it is best to complete the examination as far as may be possible, and after securing the applicant's signature, so that he may be fully committed, to hold the papers until he entirely recovers, notifying the company in every case that the application is held and for what cause.

Report all rejections.

Report all rejections made. Many companies now require a notice upon a blank that they furnish either separately or attached to the examination sheet. Whether this be done or not, every unfavorable opinion should be reported to the medical director.

Forwarding the Application.—The young examiner will be astonished to find that almost every company requires that the *application be forwarded through the agent.* This means that he sees the report, and may be put in possession of all facts therein noted. This would seem to negative the companies' claim that these reports are confidential documents, and to place the doctor and applicant alike in a very uncomfortable position. This custom is general and bids fair to be permanent, because the average physician is so careless that the application must be reviewed before being forwarded in order to avoid a correspondence necessitated by mere clerical errors. The ideal system, that of direct reporting, has been tried and abandoned as unsuccessful by several companies.

Confidential communications.

As a result of this prevailing system, the examiner *must eliminate from his report all really delicate and confidential matter,* and transmit it to his medical director under personal cover. Such correspondence is always solicited, and the obligation of secrecy is in almost every instance sacredly observed. If ever it be apparent that information thus given has been allowed to leak out and reach either applicant or agent, the examiner should write his medical director, and that officer's thanks, explanation, or apology will surely follow.

In such matters, a properly organized medical department will always protect its examiners, even going so far as to refuse to give other companies the name of one concerned in some

matter of delicacy, unless his consent be first obtained. It is well to bear in mind also that agents are seldom fully informed by the companies concerning the cause of rejection, though many very properly advise their examiners in confidence of the facts that have led to the rejection of their applicants.

As a matter of policy, it is well to treat an agent frankly whenever possible, and confine confidential communications to matters of delicacy that should not be known to any outside person.

THE RÔLE OF INSPECTION IN DIAGNOSIS.

The skilled physician begins his examination at the very instant that his glance falls upon the applicant, and is carrying it on even while the formal phrases of an "introduction" are falling from the agent's lips.

Value of first impressions.

The first impression of good or bad health in the person observed is of the utmost importance, but as in the reading of character, so also in the interpretation of medical impressions, there is a large percentage of error and a great need for the exercise of good judgment and the conservative application of wide knowledge.

Importance of External Signs.—The trained physician notes almost unconsciously many things the layman would pass by, and in forming an opinion as to the applicant's insurability the examiner for life insurance is of necessity largely dependent upon his familiarity with the external signs of health and of disease. He is supposed to detect opium habit, incipient mania, melancholia, paresis, arteriosclerosis, alcoholism, and many other serious morbid conditions without the aid afforded by an accurate case history, and must rely largely upon his eyes for the necessary data. Thus he is, to some extent, forced to apply the diagnostic methods that flourished in centuries past, and it may well be doubted if in this field the physicians of the modern school are as proficient as those who lived and practised during the darker periods of medical history.

It is quite possible that the fascination appertaining to clinical diagnosis and the constant and praiseworthy effort to base the practice of medicine upon exact methods have too greatly diverted our attention from the old-fashioned methods in which the use of the senses of sight, touch, and smell, unaided by modern instruments and accessories, played so large a part.

To-day it is a matter of common wonder that in times past

accurate diagnoses were made by men but slightly trained, if judged by modern standards, and lacking the great assistance afforded by the elaborate technic of modern medicine; but the wonder ceases when one stops to consider in how great a measure even now the physician is dependent upon mere inspection of the patient.

Importance of inspection underestimated.

In the case of the student this is a matter little appreciated because of the immense number of symptoms which he is taught to associate with morbid conditions without any careful grouping of those that are specific, important, and peculiar as distinct from such as are generic, trivial, or of merely collateral value.

In attempting a brief résumé of some of the more important examples of physiognomic diagnosis one must at the very outset pay a tribute to inspection by declining to discuss any of the skin diseases, the exanthemata, or diseases of the nose, eye, and ear, inasmuch as their recognition depends almost wholly upon the evidence afforded by sight. In dealing with diagnosis from this standpoint one must note several distinct things.

Points of Primary Importance.—(*a*) The speech.

(*b*) The facial expression, external appearance and contour of the body.

(*c*) The attitude.

(*d*) The gait or movement.

(*e*) The surroundings.

"Intuition."

It is by the careful and intelligent study of such evidence that many men achieve a reputation for making diagnoses of that rapid and positive kind that suggest, to the laity at least, the gift of intuition.

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In times past a necessary dependence upon this method led too often to the making of "snap" diagnoses, and it can not be doubted that they then served greatly to advance the interests of the shrewd and brainy observer who could freely and dogmatically air his opinion without fear of the explosive effects of post-mortem findings.

"Snap" diagnoses.

At the present day "snap" diagnoses are more rarely made by the broader-minded clinicians, yet the information obtained by inspection again and again points the way to a correct conclusion, and is of especial value in just such work as is that involved in examinations for life insurance. As illustrating

its general value, one may consider some of the more common examples as furnished by the study of both acute and chronic disease.

FAMILIAR EXAMPLES IN ACUTE AND CHRONIC DISEASE.

Acute Disease.—One may in imagination follow some skilful and observant clinician as he enters his hospital wards at the beginning of a term of service. His glance falls upon a patient who lies in a relaxed, helpless heap, with lips apart, muttering, perhaps, unintelligible words, and showing about the nostrils the stains of a recent nose-bleed. If not well nursed, a peculiar odor may be detected and sordes be seen upon the gums and lips or in the corners of the mouth. When aroused, the patient betrays no interest; his flushed, mahogany-like face is apathetic and stupid; his eyes dull. His tongue, bright red along its margin and over a V-shaped area at its tip, is protruded slowly and is sometimes returned only after repeated requests. When the covering of the chest and abdomen is removed, the latter is seen to be distended, and over its surface and that of the chest are a few spots resembling flea-bites.

Typhoid fever.

With such typical signs it is easy to say *typhoid*, even without the important evidence conveyed by a dicrotic pulse, temperature record, enlarged spleen, history of onset, diazo reaction, pea-soup or ocher stools, and the agglutination test of Widal.

The next patient may present a different, but no less characteristic, appearance: His attitude is active, his cheeks show a deep-red or purplish flush, one-sided or perhaps double, his alæ nasi are in constant action, and there are herpetic vesicles upon the lips. He is mentally alert, and has that anxious expression so common in acute pulmonary disease. The breathing is rapid. He coughs a hard, dry cough, which so rasps and hurts him that he clasps his hands to the seat of pain (his right breast, perhaps) and attempts to muffle or suppress it. With such paroxysms he raises from time to time a thick, rust-colored sputum, so sticky and tenacious as to cause him to spit vigorously and repeatedly before he can get it clear of his lips and into the sputum cup, to the side of which it firmly clings. Uncovering

Lobar pneumonia.

the chest, the labored breathing and lagging or immobility of one side are plainly manifest, and *lobar pneumonia* is evident, even without recourse to the physical signs, temperature, pulse, and history.

Meningitis.

Very different may be the expression and attitude of the next patient: He is neither apathetic nor alert, but the brow is wrinkled by cerebral pain, there are contracted or unequal pupils, a rigid neck, and a boring occiput. These signs, together with photophobia and hyperesthesia, make a striking clinical picture of cerebral meningitis, completed, perhaps, by a scaphoid belly and attacks of explosive or "projectile" vomiting.

Acute rheumatism.

In approaching the next patient the observer is, perhaps, unfortunate enough to jar the cot upon which he lies, thus eliciting a shriek of pain or a protest from the sufferer, who lies rigid and apprehensive, moving with caution or not at all. A curious, sour odor may be apparent, and the patient seems alert and intelligent, but is manifestly in the grip of a severe pain increased by movement. Upon uncovering the body and limbs one sees that the joints, usually the larger, and commonly those of the knee or ankle, are swollen and red; the swelling by its contour suggests a distended synovial sac, and the skin is covered with perspiration. *Acute rheumatism* is at once suggested. The author once saw a medical man totally blind correctly diagnose acute rheumatism by the odor, when standing some distance from the bedside.

Peritonitis.

The next patient may present a picture quite different from any of the preceding. He lies with one or both knees drawn up, his face is pinched, and the lips are curiously drawn, so greatly sometimes as to leave the teeth exposed, presenting, in fact, precisely the expression that one assumes when suddenly seized with violent abdominal pain. He shrinks from the hand when it is brought near the abdomen, and upon removing the covering the belly appears flat and rigid, and the breathing is almost wholly costal, diaphragmatic movement being practically abolished. Peritonitis is thus indicated, and if the right knee only be drawn up, an appendicitis with peritonitis is strongly suggested.

Thus it will be seen that a clinician is able to draw many fairly

accurate conclusions from inspection *if he be favored with typical cases*. Unfortunately, typical cases are rare. Typical cases rare.

Many other examples might be instanced if space permitted. Laryngeal obstruction, for example, with its stridulous breathing and dusky countenance, is quite characteristic, and one may readily distinguish the dyspnea of laryngeal origin from that due to obstruction lower down by the marked rise and fall of the larynx in the former.

The pediatrist depends very largely upon careful inspection in dealing with diseases of infants. The head of the hydrocephalic child, the cry and attitude of the babe suffering from a meningitis, the wizened face, snuffling cry, fissured lips, excoriated nostrils and buttocks of the syphilitic child, are sufficiently characteristic.

Chronic Diseases.—The curious and extreme duskiness of congenital heart disease is almost pathognomonic, for in only two conditions can such a degree of cyanosis be seen in a walking patient,—namely, congenital heart disease and an extreme degree of emphysema,—the one a disease of childhood, the other of adult life and usually of middle age. Hence the two conditions may often be diagnosed at sight. Congenital heart disease and emphysema.

Marked emphysema presents a striking picture even when the cyanosis is not extreme. The chest is that of forced inspiration, being rounded so that its anteroposterior and transverse diameters are equal. The epigastric angle is broad, the interspaces are narrow, the neck is short, shoulders are high, back is rounded, sternomastoid muscles are prominent, and the move ment in breathing is vertical and lifting rather than expansile. Moreover, Litten's sign shows the low position of the lung border and its trifling excursion. The apex-beat is lacking, though there may be a marked impulse in the epigastrium. In such cases cyanosis may be evident as a slight duskiness of the lips, ears, and finger-tips, or the extreme grade before mentioned. The cough in advanced cases is characteristic, and, once heard, never forgotten. It is urgent, violent, and greatly prolonged, requiring a distinct wheezing effort to keep it going.

Very different is the appearance of the so-called alar, pterygoid, paralytic, or phthisical chest. Here the anteroposterior diameter is small compared with the transverse. The interspaces The alar chest.

are broad, the epigastric angle is sharp, the chest is long in its vertical plane, the scapulæ project behind like wings, and the neck is long and slender.

Pretubercular type.

In a book written nearly two hundred years ago * one reads the following: "The divine Hippocrates tells us that persons of a fine contexture, tender, and who have a small shrill voice, thin clear skin, a long neck, narrow breast, depressed or straight chest, and whose shoulder-blades stick out, are of all others most subject to consumption"; further, the author states that "consumptive people are likewise generally observed to be very quick, full of spirit, hasty, and of a sharp ready wit"—a very good description of the tubercular type.

Such persons often have full, soft, melting eyes, beautiful sweeping lashes, and exquisite coloring; indeed, it may well be doubted if beauty and health are so closely related as some writers would have us believe.

As to the facies of terminal phthisis: "The Hippocratic countenance" was, in the words of that great writer, "a sharp nose; hollow eyes; collapsed temples; the ears cold, contracted, and their lobes turned out; the skin about the forehead rough, distended, and parched; the color of the whole face green-black, livid, or lead colored." Such is the face that death has made his herald.

Aretæus on terminal phthisis.

Advanced phthisis is still better described by Aretæus: "Voice hoarse; neck slightly bent, tender, not flexible, somewhat extended; fingers slender, but joints thick; of the bones alone the figure remains, for the fleshy parts are wasted, the nails of the fingers crooked, their pulps are shriveled and flat, for, owing to the loss of flesh, they neither retain their tension nor rotundity; the nails are bent; nose sharp, slender; cheeks prominent and red; eyes hollow, brilliant, and glittering; swollen, pale, or livid in the countenance. The slender parts of the jaws rest on the teeth as if smiling, otherwise of a cadaverous aspect.

"So also in other respects: Slender without flesh; the muscles of the arm imperceptible; not a vestige of the mammæ, the nipples only to be seen; one may not only count the ribs themselves, but also easily trace them to their terminations"; "the

* "Theory of Consumptions," London, 1720.

intercostal spaces are hollow and rhomboidal; hypochondriac region lank and retracted; the abdomen and flanks contiguous to the spine; joints clearly developed, prominent, devoid of flesh; so also with the tibia, ischium, and humerus; the spine of the vertebræ, formerly hollow, now protrudes, the muscles on either side being wasted, the whole shoulder-blades apparent like the wings of birds."

It would be difficult, indeed, for modern writers to match this terrible description.

Another pre-tubercular type.

There is, however, another and a very different type of the tuberculous subject. In persons coming under this head the complexion is muddy; the eyes are often weak, with red and swollen lids; thick nose and lips; the face, back, and chest are covered with acne. Not infrequently they show enlarged cervical glands or the scars of a past adenitis. Spinal caries and curvature and hip-joint disease are readily noted by the examiner.

Adenoids.

Among other easily recognized conditions are the transversely constricted chest of nasal obstruction, the facies of adenoid disease, with the open mouth, vacant, dull expression, and narrow palatine arch; the broad head, prominent brow, and deformed chest of rickets; the bulging eyes, tumultuous heart action, and thyroid tumor of exophthalmic goiter; the curious fixed expression and rigid upper body of early paralysis agitans, or the tremor and forward stoop of the advanced disease; the bulge of the left chest, due to cardiac enlargement dating back to childhood or early youth; or the still more easily noted retraction due to fibroid phthisis or chronic pleurisy.

Rickets.

Exophthalmic goiter.

Paralysis agitans.

The examiner for life insurance chiefly needs ability to read the marks of bad habits or of incipient diseases that have not yet made a sufficient impression upon the body to yield marked physical signs.

The medical examiner and the clinician occupy entirely opposite positions. One deals with an unwilling witness and seeks to detect unfitness for insurance, physical or moral, without material aid and often against most embarrassing obstruction. The other has merely to sift the grain from the chaff of a vast amount of freely offered testimony.

There are many traps into which an examiner may fall, and

Incipient insanity.

none is more treacherously laid than that represented by the various forms of incipient or early mental disease. Not long ago an application reached a certain office accompanied by a letter from the agent, a jubilant letter, requesting prompt action on the part of the medical department, and saying that the applicant had made enormous sums in fortunate speculation, and was taking out a very large line of insurance. Indeed, it was said that on that day he had been examined for a policy for $100,000 in a prominent company. The risk was recommended as first-class by the local examiner and appeared to be unusually favorable, but the sudden acquisition of great wealth suggested the need of confidential inquiry, and one was set in motion. On

Expansive delusions.

the following day a telegram was received from the examiner saying that the policy should not be issued, and it was soon made clear that the fortunate speculator was the victim of the expansive delusions of paretic dementia, and had not even his carfare when taken to the detention hospital. The physician who made the examination, an extremely clever and careful man, stated that while in conversation with him the applicant was quiet in manner and conservative in his statements. In his interview with the agent this victim of paresis showed less restraint, and by his boasting gave the clue that saved the company from assuming a risk that would have proved an early loss.

Early signs of paresis.

Ordinarily, the general paretic may be recognized early in the disease by his tremulous lips and tongue ; fine intention tremor of the hands ; unequal pupils, reacting to accommodation but not to light ; staggering, ataxic, or uneven hesitant gait ; and a fibrillary tremor of the facial muscles. His speech is curiously slow, hesitant, or explosive, and he finds consonantal words particularly difficult. Moreover, his mental attitude is striking, his delusions are expansive, his schemes involve millions and are astoundingly simple, he has the finest of wives, the brightest of children, the largest house, the most beautiful grounds ; in short, he deals wholly with superlatives, and is, ordinarily, very ready to boast and to attract attention to himself whenever an opportunity is presented.

Such are the symptoms of the prodromal stage, that might attract the attention of the examiner even though he were a stranger.

Frequently, the medical examiner overlooks a developing or, indeed, an existing melancholia. This error in some instances is difficult to explain. As, for example, in the case of a man whose photograph is now in the author's possession. It would seem incredible that such a person could get insurance. His face is terrible in its expression of settled melancholy, inexpressibly sad in its hopeless gaze. The eyes seem to be looking far away into a future that promises nothing but grief. It is evident at a glance that life has ceased to have any charm for this poor fellow, yet he was recommended as a first-class risk, insured two years after the picture was taken, and, as might be anticipated, became an early loss, dying by his own hand. A few inquiries suggested by a careful study of the man's face and actions would have saved both the reputation of the examiner and the treasury of the company.

Melancholia.

Examiners should remember that the insane show very early small changes in manner, deportment, or dress that are of great significance. One who has been neat, or who by virtue of his social position should be neat, may become slovenly and untidy. He who was careful and precise becomes careless and inaccurate. The truthful man becomes an unblushing liar. The gay and jovial spirit becomes moody and sad.

Importance of minor changes.

The author has in his possession photographs of several persons who destroyed themselves while insane. All of them were taken before the mental trouble was recognized, and several before insurance was granted, yet the eyes of nearly all show to a greater or less extent either melancholia or its opposite, that peculiar "intensification of emotional expression" to which Allen McLane Hamilton refers as being characteristic of mania.

The eyes.

It is strange that insurance companies do not require their examiners to test the pupillary reactions and the knee-jerks. In an insurance blank as at present constructed there is nothing that would prevent the victim of locomotor ataxia from insuring. No specific question is asked as to the gait, the pupils, or the knee-jerks, though these are the chief diagnostic channels of information in that disease.

Patellar reflex and pupillary reactions.

In locomotor ataxia the lightning pains are apt to be regarded as neuralgic, and for that reason are oftentimes not mentioned by the applicant, or, if reported, are regarded as trivial by the

Locomotor ataxia.

examiner. Absence of the knee-jerks, the Argyll Robertson pupil, and the curious and quite characteristic gait are diagnostic.

The important point lies in the fact that early symptoms, such as lightning pains and visceral crises, are often overlooked or misconstrued, and that the typical gait is of comparatively late development. The knee-jerks disappear early in the initial stage ; the pupillary symptoms as well as the inability to stand steadily with closed eyes and with the heels together belong to an early period in the ataxic stage. Hence it follows that these matters should be covered by all insurance examination blanks.

Gait.—In locomotor ataxia when fully developed the gait is a peculiar one, often described as stamping. The patient keeps the feet well apart and lifts them much as does the unfortunate insect that attempts to walk upon sticky fly-paper. They are raised suddenly, jerked uncertainly forward beyond the ordinary limit, and then brought forcibly down with a stamp. This is the so-called *ataxic gait*, and contrasts sharply with the *spastic gait*, such as is seen unilaterally in hemiplegia or bilaterally in lateral sclerosis. In these affections the legs move stiffly and the feet can not be wholly raised from the ground, by reason of which fact the pelvis is tilted at each step and the toes describe the arc of a circle. It may be well to mention the "*reeling*," "*festinant*," "*waddling*," and "*steppage*" gaits, all of which are characteristic of important organic nervous diseases.

The *reeling or drunken gait* requires no detailed description, and points chiefly to cerebellar lesions. The patient tends strongly to swerve to one side.

The *festinant gait* of paralysis agitans is pathognomonic if marked. The patient trots or shuffles along, bent forward as though trying constantly to overtake his proper center of gravity.

The *waddling gait* of pseudohypertrophic paralysis is, of course, unlikely to be encountered by the insurance examiner. Its characteristic gait is a peculiar rolling walk, due to weakness of the glutei, that necessitates the hitching forward of the pelvis and the femoral head at each step ; furthermore, because of the weakness of the extensors, the knees are advanced, flexed, and only extended after the foot has been thrown forward and placed upon the ground. In this disease the patient can not stand on tiptoe.

The "*steppage*" *gait* is seen chiefly in multiple neuritis, where

there is foot-drop and the patient lifts the foot high at each step in his effort to raise the toe clear of the ground. The result is a ludicrous pawing action, or what appears like a continual effort to step over nonexistent obstacles.

The *gait of chorea* is interesting, though not likely to be encountered by the examiner. One foot appears to be caught as if the victim were tripping over some obstacle, then he hurries on as if to make up for the delay. Advanced cases are characterized by marked incoordination and jerking of the muscles of both the face and extremities.

Tremor.—An examiner should always be on his guard in regard to tremor of intention. In fact, *any marked tremor* is, in nine cases out of ten, pathologic and demands investigation. Of the many conditions that are suggested by this symptom one may mention alcoholism, neurasthenia, exophthalmic goiter, chronic mineral poisoning, disseminated sclerosis, paralysis agitans, chorea, and drug habits.

Importance of tremor as a symptom.

Fibrillary twitchings or flickerings, of course, suggest progressive muscular atrophy.

Many persons claim to have been born with a tremor. This is, to say the least, a doubtful statement in nearly every instance.

Expression.—The expression of the face itself is of primary importance. Not only does it point the way to a correct impression of character and intelligence, but it also bears strongly upon the diagnosis of specific diseases.

Age.—One of the most important conditions that the examiner is supposed to detect is the age. The essential point is the question as to whether the applicant's appearance is that of the age given or older or younger.

An arcus senilis, rigid temporal and radial vessels, and a dull, wrinkled, or senile skin may sometimes be found in comparatively young men. Premature baldness is of little significance, nor can any great stress be laid upon early grayness of the hair, though this, if associated with arteriosclerotic changes, is frequently the forerunner of apoplexies or other cerebral lesions.

Premature aging.

Rapid aging is a matter of great importance, and is well illustrated in figures 2 and 3, page 60. The one was taken only a few years before the other, yet it would seem as if at least twenty years must have elapsed.

FIG. 2.—AN ACTIVE, ENERGETIC MAN, AGE FORTY-NINE.

FIG. 3.—SAME MAN, SIX YEARS LATER.

Syphilis.—One must always be alert to detect evidences of syphilis in the applicant. This is sometimes easy, and again extremely difficult or impossible. The accompanying illustration (Fig. 4) shows extremely well the physiognomy of a marked case of congenital syphilis as seen in the adult. The nose is the typical "saddle-nose," the soft palate showed a perforation, the complexion is muddy, the hair gray in areas, precisely like those of a syphilitic alopecia. The two upper central incisors are peg-shaped and notched, and, to make the chain of evidence more complete, the father, a man of three score and ten, shows a pathognomonic perforation of the soft palate almost as marked as is that of the son.

FIG. 4.—SADDLE NOSE—CONGENITAL SYPHILIS.

The chief evidences of congenital syphilis are found in the appearance of the teeth, the presence of serpiginous scars, evidence of past ulceration of the soft palate, bony nodes on the tibia and fibula, the broad, flattened, or depressed nose, radiating scars about the angle of the mouth, evidences of a past symmetric keratitis, and the peculiar color of the skin, quite easily recognized but difficult to describe —a curious dull skin with a faint yellow tinge.

Cases of active syphilis may be encountered, and the author recalls that of a woman who at the time of examination seemed to be in good health, save that the pulse was unduly rapid and the temperature 99.5°F. She was freckled and her complexion appeared curiously mottled; friction with ether over the forehead, arms, and upper chest brought out a typical syphilitic roseola. Illustrative cases.

With another applicant for insurance all went well until the examiner desired him to bare the chest. This the patient resisted, protesting that it was unnecessary to waste time, and asking that he be not detained by mere formality. In the midst of the protesting there came into view through the slit in his shirt-sleeve a typical syphilitic eruption of the tertiary stage.

Bright's Disease.—The various forms of Bright's disease present, when advanced, very characteristic physiognomies; that of acute Bright's and the chronic parenchymatous neph-

ritis being oftentimes quite pathognomonic. To the insurance examiner the interstitial form is most important, and not infrequently it yields absolutely no signs, whether physiognomonic or urinary. Indeed, in its early stages the applicant appears rather above than below the proper standard of health. As the disease advances, the characteristic puffiness of the eyelids appears. This puffiness is extremely important and suggestive when encountered in a man under sixty years of age. It varies greatly at different times of the day. In the early morning hours the eyelids may be distinctly tense, somewhat paler than the rest of the countenance, and may show a certain curious translucency. As the day advances, they become more baggy, and by afternoon or evening the swelling may have disappeared, the thin skin having fallen into fine, deep wrinkles.

Physiognomy.

It would be impossible to emphasize too strongly the impor-

FIG. 5.—BRIGHT'S DISEASE.

FIG. 6.—BRIGHT'S DISEASE.

tance of recognizing abnormalities in the color of the skin, and Bright's disease in its various forms offers a remarkable series of tints, varying from an exaggeration of that of apparent health to the curious dough-white skin of the acute disease.

The color of the skin.

Between these lie the sallow pallor called by the older writers "pallor luteus," and the curious fawn color of advanced interstitial nephritis. There is a "renal look" about the victim of a nephritis difficult to describe, but striking and easily recognized by the trained eye. The fact should not be overlooked that in interstitial nephritis marked edema can not be anticipated early in the disease. When it does appear, it is usually due to secondary cardiac weakness, and presents the features of the edema of heart disease.

Edema.

Cyanosis.—Cyanosis, when present, is most apparent on the mucous membranes (lips and tongue), finger-nails, cheeks, ear-lobes, over the patellæ, and, in short, at all points where superfi-

cial color is usually most apparent. It varies greatly in depth of color and distribution, being general or local, sometimes bluish-red, the latter color strongly predominating, or passing through all stages between a mere grayish tinge and a bluish-black lividity. Its presence always suggests disease of the heart or lungs, and to name its specific etiologic factors would be to give a complete list of all conditions that may interrupt the free interchange of oxygen and carbonic acid in the lungs, or interfere with the local or general circulation.

Chronic Alcoholism.—The symptoms of acute alcoholism need not be considered, and the familiar physiognomy of the confirmed drunkard needs no elaborate description. The dull, humid eye, prominent venules on cheek and nose, the brilliant color and tumid appearance of the latter member, are sufficiently well known to all. Many men and women who are victims of this habit show no signs of the kind just described, and too frequently the insurance examiner is deceived, and the company insures a "sneak" or "spree drinker."

The tremulous hand, irritable heart, and furred tongue, or a low specific gravity may suggest the need of a special inquiry.

Valvular Disease of the Heart.—Heart disease in its various forms often flies its signals in the face or upon the body of its victim. *Congenital heart disease* has already been mentioned as producing a degree of cyanosis comparable to that of the most extreme emphysema. *Mitral disease* of the regurgitant or obstructive type is often suggested by the vivid coloring of the cheeks and ears, particularly marked in the delicate skin of the young girl. This color is slightly dusky, not the bright color of perfect health, but is, nevertheless, of a kind that elicits the admiring comments of the victim's family and friends. In its terminal stages mitral disease is often strongly suggested by the attitude of the bed-ridden patient. Such a one sits propped up in bed, orthopnea being extreme; the face, ears, and finger-tips are dusky, the breathing rapid and labored, and if death be imminent, there is a curious restlessness that finds expression in an almost constant rolling of the head from side to side.

Misleading color in mitral disease.

Aortic Regurgitation.—Most characteristic of all are the outward and visible signs of *aortic regurgitation.* The person suffering from this disease is usually thin, pale, nervous, and

high-strung. The trained eye will note at a glance the pulsating carotids and throbbing temporals and radials. Not infrequently the capillary pulse is visible in the nails, or may easily be shown by reddening the skin of the forehead or chest by vigorous friction or by applying a glass slide to the inner surface of the lips. *The Corrigan pulse is often felt while shaking hands.*

Tricuspid Regurgitation.—Tricuspid regurgitation leads to cyanosis, distention or rhythmic pulsation of the jugulars, and in advanced cases to pulsation of the liver, easily verified by including that organ between the hands, one over the back, the other in front.

Aortic Aneurysm.—The pulsation of an aneurysm of the aorta may sometimes be readily seen, but in most cases it requires careful tangential inspection of the chest. If it involve the ascending portion of the arch, a pulsation is evident in the aortic interspace or its immediate vicinity.

Tangential inspection.

The points especially likely to show aneurysmal pulsation are the following:

Pulsation areas.

The space between the right sternal and parasternal lines, from first to third rib.

The manubrium sterni itself.

The fonticulus gutturis.

The back from the third to the sixth dorsal spines in the interscapular region.

Less frequently, pulsation from aneurysm is seen to the left of the sternum above the third rib.

It should be remembered that aneurysmal pulsation is a slow, lifting heave, not a sharp shock; and that pulsation in various portions of the chest may be due to causes other than aneurysmal tumor. Actual aneurysmal tumor can hardly be overlooked if the chest be bared and the light sufficient and properly directed. The pomum adami occasionally shows a rhythmic jerking corresponding to the tracheal tug of an aneurysm of the transverse portion of the arch.

Aneurysm of the abdominal aorta is relatively rare, but, unlike aneurysm of the thoracic aorta, is frequently diagnosed, and in a large majority of cases the conclusion is erroneous.

Violent pulsation of the aorta is quite common in persons having a thin abdominal wall and laboring under excitement, or

in such as are neurasthenic or hysteric. *If it be due to aneurysm, it should be possible to grasp an actual yielding expansile tumor.*

Hoarseness or brazen cough and inequality of the pupils may direct attention to aneurysmal tumors.

The Appearance of the Abdomen.—The observant physician may at times obtain much information from the appearance of the abdomen.

The "Poached-egg Belly."—In a thin man a big belly is invariably pathologic, and suggests dilatation of the stomach or colon, tuberculosis, hepatic cirrhosis, splenic enlargement, or, in short, ascites, morbid swellings, or growths.

Striæ.

The presence of striæ in a thin male points to past pathologic distention or excessive loss of weight; in a woman, to the same conditions or to past pregnancy. If the striæ be white, the condition producing them must have been remote; if they be bluish, it must have been recent.

Morphinism.—Many of the victims of the morphin habit present no external signs that would assist the examiner, while in others there is seen quite frequently a well-marked physiognomy of morphinomania. In such persons the mental state is likely to be either one of decided buoyancy or marked depression. If the individual be under the influence of the drug, his pupils may present the familiar pin-point appearance. They are sometimes, however, unequal or even markedly dilated.

Mental state and outward signs.

Many of the victims of chronic morphin poisoning are habitual liars, and evince the curious tendency to speak falsely even when the truth would serve them better. In advanced cases these persons are thin, sallow, and prematurely old, the hair being gray, the skin wrinkled and inelastic. In others there is a curious puffiness of the face, strongly suggesting Bright's disease, although the kidneys may be quite normal. The tongue is coated, and unless the subject be under the influence of the drug, he is restless, irritable, and moody. One of the minor symptoms that sometimes attracts the physician's attention is the frequent rubbing of the nose, an outward and visible sign of the cutaneous irritation produced by the drug. If the slightest question arise as to morphinomania, the physician should not hesitate to examine the body for hypodermic marks. The

The itching nose.

author has frequently seen the arms, shoulders, and thighs thickly dotted with the little marks left by the hypodermic needle, sometimes showing infiltration, thickening of the skin, or actual abscess formation. The outer side of the thigh and the left arm are the favorite points, because they are hidden from view, yet accessible. The confirmed morphinomaniac disregards clothing and dirt in using his syringe, and frequently excites suppuration at the site of puncture.

Cocain Poisoning.—The cocain habit in its outward signs corresponds very closely to morphinomania; but there is more likely to be evidence of a weak circulation, as shown by dark subocular rings, and a nervous, irritable, weak pulse with tachycardia. The pupils are usually markedly dilated, the gait is uncertain, and, as in morphinism, the victim passes from buoyancy to depression as the effect of the drug wears away. Hypodermic punctures may be present, and, as a rule, the attendant brown stain may be made out around the central point. There is very likely to be tremor, delusions of persecution are common, and one of the most remarkable manifestations of the disease is the perverted cutaneous sensation that leads the victim to believe that worms are creeping upon the surface of the body or just beneath the skin. This symptom is so frequent as to make it of real value in ordinary diagnosis.

Women and physicians make up the great majority of cocain and morphin habitues.

Color deceptive.

Anemia.—In anemia the color of the face is oftentimes an unsafe guide, and too great stress should not be laid upon a pale face in an indoor worker, provided there be no other signs of disease. In such persons the skin of the face will naturally correspond to that of the chest or arms, but the mucous membranes should show a healthy color. On the other hand, a severe anemia is not inconsistent with a high color and bright red lips.

Illustrative cases.

The author recalls two cases of leukemia in young girls seen quite recently, in both of which there was a high color. In the one there was a spleen extending below the umbilicus, in the other an almost universal adenitis, and in both the blood examination yielded evidence of a severe leukemia, lienomedullary in the one, lymphatic in the other. All this being true, it is nevertheless a fact that in most anemias the color of the face and

mucous membranes is a safe guide, and the individual with pallid cheeks, lips, tongue, and ears, whitened conjunctivæ, and finger-nails that lack the healthy pink is an impaired risk.

Primary and secondary anemia.

Of particular importance is the intermixture of a yellowish or grayish tint with the white color of the skin. There is, for example, the greenish-yellow pallor of *chlorosis*, the lemon yellow of *pernicious anemia*, the curious earthy tinge so common in *cancer of the stomach*, the yellowish or even bronze-brown pigmentation of *Addison's disease*, the muddy pallor of *tertiary syphilis*, the sallow skin of *chronic malaria*, the yellow tinge of *chronic hepatic affections* or certain cases of *mitral disease*, the grayish leaden pallor of various exhausting diseases, the fawn color of certain cases of *interstitial nephritis*.

In all such conditions the change may be noticeable chiefly in the face, but is, nevertheless, general; or, as in the case of Addison's disease, laid down in patches corresponding to points of friction or of exposure to the light and sun.

In marked contrast to these is the dead-white, doughy pallor of *parenchymatous nephritis* and the florid face, highly colored and prominently veined nose and cheeks, of the man with *lithemia, gouty kidney, or hepatic cirrhosis*.

It is well to remember that jaundice and sallowness are by no means early or constant symptoms in chronic interstitial hepatitis.

Acromegaly and Myxedema.—In certain diseases—as, for example, acromegaly or myxedema—the diagnosis may be made at a glance, and as with better knowledge such relatively rare ailments tend to multiply, the examiner should be on his guard.

Not alone an index of character.

The Eyes.—Every clinician should accustom himself to see more than mere expression in the eyes. To be sure, they are the windows of the soul, and the shifting evasive glance and hang-dog manner may suggest bad habits concealed; but still more important is the condition of the pupils, the appearance of the ocular conjunctivæ, and the presence or absence of the arcus senilis, old opacities, an exophthalmos, or the paralysis of ocular muscles.

Paralysis of an ocular muscle coming on in adult life is of serious import. It is manifested in ptosis or the various degrees of squint, and strongly suggests meningitis, locomotor ataxia, syphilis, tumors, hemorrhage, or some profound toxemia.

The Arcus Senilis.—This symptom was formerly supposed to indicate fatty degeneration, but the prevailing tendency is to consider it as merely an indication of the degenerative processes incident to advanced age. Occurring in a comparatively young man it would suggest the need of special care in the investigation of the heart and blood-vessels.

Nystagmus.—This involuntary vertical, rotatory, or lateral movement of the eyeballs is of especial importance in an adult, pointing to locomotor ataxia, disseminated sclerosis, tumor of the cerebellum or pons varolii, or, rarely, to epilepsy and Friedreich's ataxia.

Exophthalmos.—Exophthalmos is a sign of serious import, suggesting, if unilateral, a growth or tumor back of the eye; if double, exophthalmic goiter, in which case one would expect to find tachycardia and enlargement of the thyroid gland.

Corneal opacity suggests inquiry as to past strumous manifestations and specific infection.

Cataract often reflects serious organic disease or a general degenerative process. Juvenile cataract is frequently associated with struma or syphilis.

Voice and Speech.—A great deal of valuable information may be gained by close attention to the voice and speech of a person under examination. All physicians recognize the curious pitch of the voice in a phthisical patient; the whispering of the victim of simple, malignant, or tuberculous laryngitis, hysteric aphonia, or an abductor paralysis due to the pressure of an aneurysm or mediastinal growth upon a recurrent laryngeal nerve. The curious pitch and harsh quality of the voice of the prostitute contrasts curiously with the soft even tones of her virtuous and highly cultured sister; the nasal twang of adenoid disease or polypus, the tone due to chronic or acute tonsillitis, the muffled voice of the victim of stomatitis, glossitis, or the dry tongue of fever, are all easily recognized and are distinctly suggestive.

Quality and pitch often suggestive.

Limited space will not permit an adequate discussion of the defects of speech.

The *mumbling speech* associated with a curious immobility of the lips, tremor, and muscular wasting of the tongue points to glossolabiopharyngeal paralysis, amyotrophic lateral sclerosis, or pseudobulbar paralysis.

A *crescendo speech* is sometimes heard in paralysis agitans. Beginning slowly and hesitatingly, in a high-pitched tone, the victim ends in a furious volley of words.

Slow, *syllabic*, or *scanning speech*, combined with intention tremor, suggests disseminated sclerosis, with that rare and easily recognized disease, Friedreich's ataxia, as a remote possibility.

Aphasia and the significance of its various forms hardly admit of an extended description in this volume.

Asthma.—As regards appearance there are two distinct types—(*a*) the neurotic, (*b*) the gouty.

Types.

(*a*) Victims of the former furnish a characteristic physiognomy if the disease be advanced and severe. Usually nervous and wiry looking, with a curious gravity of expression, emphasized by a drawing-down of the corners of the mouth, they are "high-shouldered and round backed," and show distinctly the marks of chronic suffering.

(*b*) The gouty asthmatic is stout, florid, and big bellied, quite the opposite of the neurotic.

Only in severe or very old cases does a characteristic physiognomy appear, and in most instances the external appearance will afford no clue.

Dyspnea may in either case suggest asthma as the underlying cause. It may be evident during conversation or appear upon slight exertion.

The Tongue.—A volume might be written upon the appearance of the tongue as related to diseased states. It should invariably be inspected by an examiner, and may yield important information upon the following points: (*a*) The presence of epithelioma or tubercular ulceration; (*b*) scars caused by tongue biting during epileptic seizures, or due to incipient glossolabiopharyngeal paralysis; (*c*) muscular spasm associated with the twitching lips of paresis; (*d*) tremor and jerky protrusion due to chronic alcoholism; (*e*) marked deflection associated with muscular atrophy or cerebral lesion; (*f*) deep fissures along its edge, suggesting past syphilis; (*g*) the dry, harsh, or beef-red tongue of exhausting disease; (*h*) unilateral coating, suggesting hemiplegia (may be due simply to a bad tooth on the coated side); (*i*) the pallor of anemia; (*j*) cyanosis due to cardiac or pulmonary disease.

Should always be inspected.

The ordinary forms of coated tongue are too well known to require elaborate description.

The Hands.—The amount of knowledge that may sometimes be obtained by an inspection of the hands is astonishing. It is quite useless for an applicant to deny chronic rheumatic gout or rheumatoid arthritis if the hands show the characteristic deformities and nodosities that result from those diseases. The assistance afforded by the examination of the hands in cases requiring identification is specially considered further on, under the head of "Stigmata of Occupation."

Gout and rheumatoid states.

The general form and texture are not unimportant, and often reflect quite accurately the physical make-up of the patient. We recognize the slender flexible hand of the nervous

FIG. 7.—CLUBBED FINGERS—CHRONIC PNEUMONIA.

individual as something quite distinct from the more clumsy one of the phlegmatic man. In those who are predisposed to tuberculosis one often finds a hand of the feminine type: delicate, easily compressed, and imparting in shaking hands a distinct impression of lack of vigor and tone. In others of the same type the hands themselves are thin, the fingers slender, and the joints clumsy and prominent. The hand of long-standing and advanced disease is well known and easily recognized. The clubbing of the finger-tips and incurvation of the nails are extremely characteristic. The same conditions are met with in certain cases of chronic emphysema and in some cardiac lesions. (Fig. 7 shows this condition in a child who had suffered for about a year from chronic pneumonia.)

Pulmonary and cardiac disease.

The Finger-nails.—The general condition of the finger-nails often serves as an index to the nutrition of the patient, and many interesting details could be written did space permit. One point should not be lost sight of by the examiner—namely, that transverse ridges present on *all* the nails point almost invariably to a severe illness that has occurred within six or seven months, this being about the period required for their removal by nail-growth. Fothergill states that three months after such an illness the mark will have grown half-way up the nail. The same condition existing in a single nail would be of no importance, indicating merely some interference with nutrition of the matrix, such as would be produced by a trifling injury. The importance of this apparently trivial sign as a stimulus to memory can be readily appreciated by the examiner who realizes how extraordinarily forgetful is the average applicant for insurance.

Significance of ridges.

THE QUESTIONS ORDINARILY FOUND UPON THE EXAMINATION BLANKS OF AMERICAN INSURANCE COMPANIES.

(Arranged in Alphabetic Order.)

To many an examiner the questions upon an examination blank seem excessive in number, blind in meaning, and full of difficulty in practical application. He naturally wishes to know why they are there and how they should be answered. In this chapter an attempt has been made to supply this information as fully as is consistent with the plan and scope of the book. The following summary is neither complete nor exhaustive, nor does it mean that one is obliged to cover the whole field in making an everyday examination.

Yet the author hopes it may serve to place before the physician the leading facts and to emphasize the necessity for and method of conducting a careful investigation when such conditions as are herein described are either seen by the examiner or admitted by the applicant.

In all doubtful cases of illness the examiner should, if possible, interview the attending physician and secure his report.

Trivial matters must not be allowed too much space upon the examination blank, and, on the other hand, important facts should be carefully investigated and fully explained. *What is worthy of mention is usually worthy of explanation.*

Chaff and wheat.

The ability to sift the chaff from the wheat affords the best evidence of a physician's common sense, training, and ability.

All questions should be put in the simplest form. Technical terms convey no meaning to the average applicant for life insurance.

THE PROPER COMPLETION OF AN EXAMINATION PAPER.

It is now necessary to pass from the general to the particular, and discuss the exact procedure to be followed in filling out the blank form or forms that constitute the application for insurance and the examiner's report.

These forms are nearly the same for all companies, and are, for the most part, when completed, a full case history.

The application.

The first part, or, according to the custom of some companies, a separate sheet, contains a series of questions to be asked by the agent, who fills in the blanks with the answers of the applicant, and after securing the latter's signature, appends his own as witness.

NAME, ADDRESS, AND OCCUPATION.

Be specific.

The applicant gives his full name, his address, and his occupation. This last inquiry must always be specifically answered. It is not enough to say that a man is a "clerk," "commercial traveler," "superintendent," "cashier," or "lumberman." The company desires to know his exact duties, whether he is a clerk in a dry-goods store or in a pool room, whether he superintends a railroad or a dynamite factory, is a wealthy lumberman or a log driver.

They ask concerning his former occupations, and here also demand specific information.

Insurance in Force, Pending, or Contemplated.—Questions as to the kind and amount of insurance sought, the name and relationship of his beneficiary, the amount of insurance carried, in what companies, and when taken, follow in order.

The applicant is asked whether any negotiations for insurance in other companies are now pending or contemplated. This is more important than might at first be supposed, for not infrequently a person has made an application for insurance that has not been granted, yet he reports it as pending; he may, in fact, do so innocently because no notification of rejection may have reached him. *The question should cover the dates on which the applications reported as pending were made.* Furthermore, the company is thus informed whether or not, with such insurance as the applicant carries or has applied for, he is in a position to carry the additional insurance they are asked to grant. If the

amount asked for is excessive and incommensurate with his means, a moral hazard is introduced, as he may either be taking insurance cheaply sold to swell an agent's record or he may contemplate suicide and thus be dishonestly attempting to protect his family from the results of his own cowardly act.

SOCIAL STATUS, ETC.

No company knowingly insures men or women who are not engaged in honest callings. The gambler or the prostitute, the man under indictment or under a cloud of any kind, is best avoided for reasons too patent to need an extended description.

If the examiner has any reason to suspect the social status of any individual proposed for insurance, he must carefully investigate the matter, no less for his own sake than for that of the company he represents. Married men are, generally speaking, better risks than are those living a single life whether they be bachelors or widowers.

Marriage improves the life.

There is, however, one exception to this rule. This is found in the case of the man who marries late in life, a great disparity existing in the ages of the bride and groom. In such instances the risk is not, as a rule, improved by marriage.

Hufeland, one of the older statistical authorities, sings the praises of matrimony, and states that there is hardly an instance that would justify the belief that a bachelor ever attains a very advanced age ; he would even have one believe that a multiplicity of marriages is in itself favorable to longevity, but one may be permitted to doubt his report of the remarkable case of Dr. Longueville, who lived to the astonishing age of one hundred and ten, married ten times, and was made a happy father by his last wife when in his hundred and first year.

Dr. Longueville.

Illiteracy in an applicant operates in some companies as a bar to insurance. It is assumed that a man who can neither read nor write is not likely to properly understand the contract, and that his statements as to family history and other important matters are open to greater doubt than would exist in the case of an educated man. Further, it is assumed that his station in life is apt to be that of a day laborer or at least one that requires only manual labor, so that he is likely to be unable to carry the policy for which he applies.

Illiteracy.

This is, in general, a rule based upon sound reasoning, but one would think it should not be absolute. Any one can recall cases in which such an illiterate applicant was a good business man and a prosperous and useful citizen.

The examiner should in such instances always state to the home office all facts known to him regarding the applicant's character and social condition.

RESIDENCE.

"*Have you ever changed your residence or occupation on account of your health?*"

Importance of the question.

One company asks, "How long before or after the death of a consumptive did you occupy the same house or room, and how long and when at any time have you been closely associated with a consumptive?"

Most companies decline all risks offering in localities that are notoriously unhealthy, but competition for business has led to a great extension of the boundaries that were laid down in years past.

The older policies contained, and many still retain, a clause making it necessary for a policy holder to secure a permit from the company if he contemplates a journey of such a nature as would involve an added risk to health.

Change of Residence.—The question as to whether the applicant has ever changed his residence or occupation on account of his health is of considerable importance, as the following experience will show:

Illustrative case.

A short time ago the author examined a young man of good weight and color and clean family history. Upon removing the clothing he was struck by the fact that the bony chest was ill formed, though covered heavily with fat in such a way as to make the applicant when dressed appear to be a large-chested man, and sufficient also to give him a large chest measurement. Upon percussion the right apex was very dull, and auscultation revealed marked tubular breathing over the whole upper right lobe, front and back. He had been repeatedly examined and accepted for a large total amount of insurance. Upon careful questioning he admitted having changed his residence to the south for a winter to recover from the effects of

a "pneumonia." Inquiry developed the fact that he had probably had a tubercular process, and that his was, in fact, merely a case of arrested tuberculosis. He was, of course, declined.

In many cities cases of arrested tuberculosis are to be found in large numbers, and such persons frequently have but few signs, perhaps none, recognizable by the hasty or formal examination. This is especially true of cities or towns located in States the population of which has been largely reinforced by health seekers, and hence one can easily see the value of a specific question as to change of residence or occupation on account of health.

ARRESTED TUBERCULOSIS.

High altitudes.

It should never be forgotten that arrested tuberculosis, especially in high altitude regions, where the air-cells become well distended, may be entirely beyond detection by ordinary means, and also that no man who has ever had tuberculosis, however remote, is a fit subject for a straight life policy at ordinary rates.

APPLICANT'S WARRANTEE.

It may be stated here that the applicant is in all cases obliged to subscribe to a warrantee of the truth of his statements, and should invariably be requested to read it before attaching his name to the application.

APPLICANT'S AGE.

(*Usual question: Age counting to nearest birthday?*)

This is a matter of vital importance, for it determines the rate of premium and the question of acceptance or rejection. Applicants under eighteen or over sixty-five years of age ordinarily are not accepted.

Old young men.

Does the Applicant Appear Older than the Age Given?—It is a matter of common knowledge that some men are older at thirty than are others at sixty. There are many young men who have the gray hair and the rigid vessels of old men. Such are frequently the children of overworked, high pressure, neurotic, or gouty individuals, and, bearing in mind the old adage that a man is as old (medically) as his blood-vessels, we see at once that these *old young* men are not first-class risks.

Again, one finds men of middle age who have lived too fast. It may have been dissipation; it may have been hard work at high pressure; it may have been the stress and storm of business worries or disasters. They may, at all events, have added twenty years to their age in living five. (See Figs. 2 and 3.)

The following illustration will serve: A gentleman, fifty years old, presented himself as a candidate for reinsurance. When last seen and recommended, he was the picture of sturdy robust health, but in five years had become an old man. His general appearance was that of a man sixty-five or seventy years of age; his hair was gray, his vessels prominent, his color bad. Upon being told that an examination would be useless he was surprised and shocked, but finally said: "It is quite true; I have, as you say, aged in the past few years. I am an old man. I have lost $40,000 in the last two years, and have worked night and day to save the remnants of my little fortune. I believe, nevertheless, that I am physically sound, but feel as old as I look." Three years later he died of Bright's disease.

Any rapid aging of an individual is to be considered of serious import, and no man should be recommended for insurance at ordinary rates who is in appearance *decidedly* older than his stated age. He may be granted a short endowment in certain special cases, but the facts must be fully stated to the home office.

Age and associated conditions.

Again, one must consider age in connection with family history and a predisposition to certain diseases. The young man is especially liable to tuberculosis, and this is particularly true if he have a family history suggesting such a tendency. If such be the case, the examiner will note well his complexion (see Rôle of Inspection), his weight and height, the presence of old scars about the cervical region, the evidence of past disease of the hip-joint or knee, the general shape and capacity of his chest, his color and weight, and the nature of his present occupation. In older men, especially if the family history be indicative of a tendency to diseases of the heart or kidney, or if family members have died of apoplexy or paralysis, the physician will examine with great care the condition of the urine and the character of the pulse, especially noting its tension and the condition of the temporal vessels. Overweight, excessive abdominal

measurement, and the general appearance are in such cases of great importance. (See Rôle of Inspection in Diagnosis.)

Dr. Edgar Holden has called especial attention to the favorable death-rate in middle-aged lives under careful selection, and believes they are extraordinarily profitable if chosen with a proper understanding of the special problems involved.

W. T. Standen is quoted as saying that "An examiner should more readily determine that a man at seventy-five would live out his brief expectancy of six years than a youth at twenty his of forty years."

Difficulties attending insuring of elderly lives.

Dr. Holden * states that an insurance of $34,000,000 on lives between thirty-eight and fifty years of age showed an actual loss of only 42.4 per cent. of the expected. The special difficulties attending the selection of middle-aged lives arise chiefly from (*a*) the curious latency and obscurity of the symptoms attending serious disorders. (*b*) The tendency to conceal important evidence of degenerative processes, of which Holden mentions loss of weight, mental torpor, vertigo, poor memory, dyspnea, frequent urination, slight muscular weakness, fibrillary twitchings, fulgurant pains, and local anesthesia. (*c*) Exaggerated statements as to family longevity. (*d*) A failure on the part of the examiner to appreciate the alternative conditions due to "hereditary predisposition."

QUESTIONS.

"Have you ever had any of the following diseases?"

Abscess (Boils).—The company desires to know when, where, and from what cause abscesses have appeared. Whether they were subacute and readily removable, or severe, chronic, and involving important structures.

Significance of localization.

Carbuncles in elderly persons suggest diabetes. Abscesses in the cervical triangle, hip, knee-joint, or spine point to a tubercular taint; in the groin, to appendicitis, psoas abscess, or past venereal disease; in the legs, to tuberculosis, general malnutrition, syphilis, or varicose veins; about the rectum, to fistula.

* President's address, Association of Life Insurance Medical Directors, May, 1897. "Medical Examiner," June, 1897.

The necessity for a careful and full explanation is, therefore, manifest.

Age.—(See p. 76.)

Apoplexy.—(See Tremor, Convulsive Seizures, and Paralysis.)

Appearance of Applicant.—"*Is he erect, active, healthy, and vigorous?*"

Weight and color deceptive.

The general characteristics of health as evidenced by the outward appearance are too well understood to require an extended description, but one should bear in mind that mere weight and color are not invariably to be relied upon. The gaunt mountaineer, for example, may be an infinitely better risk than the thick-set ruddy brewer.

Amputation.—(See Physical Defects and Deformities.)

Appendicitis.—In an application for life insurance appendicitis masquerades under many disguises. Among these are "stoppage of the bowels," "bowel trouble," "constipation," "inflammation of the bowels," and "colic." Such obscure descriptive terms oftentimes require a careful investigation to determine their true meaning and significance. "Peritonitis," as all medical men know, means, in a vast majority of cases, either disease of the female pelvic organs or appendicitis. On the other hand, the terms used may be found to cover trivial and minor ailments that some halting physician has sought to dignify by an imposing title. In any and every case where appendicitis is suspected the company will expect from its examiner a report covering the following points:

Alternative terms.

Necessary data.

Number, character, severity and duration of attacks, and date of last attack; freedom from symptoms since last seizure; length of illness; presence or absence of complications; whether an operation was performed, and, if so, what was accomplished—i. e., was the appendix removed, or was simple drainage established?

He will, further, report upon any indications of postoperative hernia, the condition of the digestive functions, the question of constipation, and the actual condition of the region involved, as far as it can be determined at the time of examination.

Appendicular hypochondriasis.

The significance and importance of localized resistance must always be borne in mind. Due consideration must also be given to the fact, as stated by Osler, that there is at the present day a well-marked appendicular hypochondriasis.

Typical Symptoms.—The cardinal symptoms of the true attack are too well known to require extended description: (*a*) Pain in the right inguinal region. (*b*) Nausea, vomiting, and usually constipation. (*c*) Fever. (*d*) Localized tenderness at McBurney's point.

It is well to remember that pain is frequently diffuse or referred to regions remote from the seat of mischief, and that it often consumes from twelve to forty-eight hours in becoming properly localized; and, further, that the disease may closely simulate a great number of other conditions—such, for example, are: pelvic peritonitis, to be differentiated only by a careful vaginal examination, biliary and renal colic, Dietl's crises in cases of floating kidney, and mucous colitis, all of which will be considered under "Colic." Intussusception and internal strangulation, when seen late, are sometimes sources of great difficulty. Osler says, "It is not often difficult to decide when the cases are seen early and when the history is clear, but mistakes have been made by surgeons of the first rank."

Diagnostic difficulties.

The author has known of several cases of typhoid fever that were operated for appendicitis. Indeed, it must not be forgotten that the appendix may be involved in the course of typhoid, and also in tuberculosis. Ordinarily, the fecal vomiting of obstruction, the tenesmus and bloody stools of intussusception, the Widal test, and low leukocyte count of typhoid would serve to prevent an error in diagnosis; but if difficulties in differentiation arise during the *acute* stage, the medical examiner may be pardoned if he does not invariably make his long range diagnosis with accuracy.

Frequency of diagnostic errors.

Insurance companies regard all cases of probable or proven appendicitis as impairing the risk, but vary greatly in their rulings.

Dr. Albert Wood, Medical Director of the State Mutual Life Insurance Company, of Worcester, has conducted a very careful investigation of this subject, having in view the question of acceptance at ordinary rates, the postponement, or the rejection of lives impaired by such a history, and has discussed the whole matter in an admirable article * which is intended to outline the

* "Medical Record," Aug. 22, 1896.

general principles that should govern the insuring company in dealing with this complicated question. His conclusions may be briefly summarized as follows:

Rules Governing Acceptance.—

Rules representing maximum liberality.

1. Applicants who have suffered from acute nonsuppurative appendicitis (appendicitis obliterans), the appendix not having been removed, are safely insurable after two years of complete immunity.

2. Applicants who have had the same form of the disease, but from whom the appendix has been removed, may be insured after one year of immunity—it being assumed in all cases that no bad effects have been experienced subsequent to operation.

3. An applicant who has had suppurative appendicitis followed by removal of appendix by operation or in whom simple drainage has proved sufficient, may be accepted after two years. (It would seem to the author quite probable that in the latter class a longer period, say five years, might generally be found applicable, as the percentage of recurrences is certainly greater in such than in those whose appendix has been removed. Dr. Wood's conclusions are, nevertheless, quite in accord with his statistical material.)

4. When the abscess has ruptured internally and emptied through the bowel, he would lay down no general rule, but would act upon the facts presented by each individual case. (From opinions expressed by several eminent surgeons, the author believes that these are quite as safe as the cases in which drainage from without has been employed, provided that adhesions are not a source of discomfort.)

5. Chronic relapsing cases. In these he suggests a period of postponement of from three to five years, dating from the last attack.

6. Cases complicated by general peritonitis. In such postponement for one year is recommended, if recovery has been prompt and complete and the appendix has been removed. If not removed, a period of three years of immunity is demanded.

The foregoing rules should be considered the most liberal that could be adopted, and as a matter of current practice the terms of postponement are made somewhat longer. Age should also be considered, as a majority of cases occur under the age of forty years.

Careful differentiation required.

Asthma.—It should be remembered that many consumptives regard their disease as asthmatic, and that dyspnea may be cardiac, renal, obstructive, or due to true asthma. Cardiac dyspnea is usually chiefly manifested upon exertion or is greatly influenced by certain positions of the body. It is not, like asthma, an expiratory dyspnea, but a simple shortness of breath, more of an "air hunger." True asthma comes on in paroxysms, and is expiratory in type. It may depend upon some removable cause, as nasal polypi or similar conditions. It is sometimes stated that asthma does not shorten life, but this can not be true, for its effects are such as to make its victims less resistant to acute pulmonary diseases than are healthy individuals, and, moreover, it tends to wear out the heart.

Hay-fever may be accompanied by asthma, and renal asthma must not be forgotten. This can not easily be differentiated from true asthma, and a very careful urinary examination is always demanded. Attacks exactly like true asthma may also be due to pressure; as, for example, that due to aneurysm of the aortic arch. One must, therefore, in cases with an asthmatic history, examine with special care (*a*) the lungs, for chronic bronchitis, tuberculosis, and emphysema; (*b*) the heart and blood-vessels, for valvular or myocardial disease, aneurysm, or arteriosclerosis; (*c*) the urine, for evidence of a chronic nephritis.

Necessary data.

The examiner should state the number and severity of the attacks, when they first appeared, their frequency, and the date of the last attack. He should also attempt to determine their cause, and if he believes it to have been removed, state fully the reason for his opinion. The greater number of cases are rejected, or granted endowment policies for short terms; but that is a question for the medical director.

Birthplace.—(See Race.)

Blindness.—(See Physical Defects and Deformities.)

Bladder Trouble.—This question is purposely made very general, and would cover dysuria, cystitis, the passage of calculi, and any and all varieties of "bladder trouble." Here, as elsewhere, a full statement should be made as to cause, severity, frequency, and status præsens.

Boils.—(See Abscesses.)

Chest Measurements.—The chest measurement should be

not less than half the height—that is to say, a man 5 feet 10 inches in height should have a chest measurement of not less than 35 inches. It ought, in fact, to measure that in ordinary breathing. The tape should be firmly applied at or just below the nipples, and the applicant should be requested to take the deepest possible inspiration and to follow this by forced expiration. The measurements should be carefully recorded at once. If the difference between full expiration and inspiration be less than one-tenth of the maximum chest measurement, he should try again, for less than this is a poor expansion. In any event an expansion of less than two inches will not ordinarily be accepted.

Relation to height.

The medical examiner will have to teach many men to expand the chest, and *in stout persons he must draw the tape very firmly* or his figures will not do the applicant justice.

Curiously enough, *athletes and consumptives are likely to show the best expansion.* The latter will often show remarkable figures because they have been well taught, and have practised deep breathing as a therapeutic measure.

Athletes and consumptives.

The waist measure is ordinarily taken at the level of the umbilicus. In stout persons it should always be made to show the maximum measurement, and *the tape should not be tightly drawn.* If the waist measure exceeds that of the chest, the applicant is a doubtful subject for straight life insurance, and the abdomen should be carefully examined for fluid or tumors.

Waist measure.

Carbuncles.—(See Abscess.)

Catalepsy.—(See Tremor and Convulsive Seizures.)

Cerebral Hemorrhage.—(See Tremor and Convulsive Seizures.)

Chorea, St. Vitus' Dance, Convulsive Tic.—(See Tremor and Convulsive Seizures.)

Cocain.—(See Drug Habit.)

Colic.—If there be a history of colic, the company desires to know its probable origin, its date, frequency of recurrence, severity, and such other information as will serve to indicate its nature and its effect upon the individual. It may be renal, biliary (gall-stones), appendicial, due to lead, strangulated hernia, floating kidney (Dietl's crises), mucous colitis, simple gastralgia, or to abdominal aneurysm. A careful examination of the ab-

Necessary data

domen is always indicated. It may be well to recall to the reader the main symptoms of some varieties of colic.

Colic due to gall-stones is indicated by the sudden onset of severe pain in the right hypochondrium or epigastrium, radiating both upward and downward, often felt in the right shoulder-joint. It is accompanied by nausea and vomiting, is frequently, but not invariably, attended by slight or marked jaundice, and may have been followed by the passage of gall-stones.

Dietl's crises.

Colic Due to Floating Kidney.—Dietl's crises are extremely interesting from their close resemblance to attacks of biliary colic, and every symptom, even jaundice, may be present. The author had one patient who was operated upon for gall-stones, when the kidney was the source of trouble, and another, operated upon for the purpose of anchoring a floating kidney, whose attacks proved to be due to gall-stones. In the first instance the attacks were caused by the floating kidney, yet jaundice accompanied the attacks. In the second there were both a floating kidney and gall-stones, the attacks were due to the latter, and yet no jaundice was present at any time. The occurrence of attacks like biliary colic should always suggest floating kidney. The condition is far more common in women than in men, and is generally right-sided.

Colic due to mucous colitis is often very severe, almost as severe as renal colic. The pain is frequently in the region of the left kidney, but does not radiate, and is relieved by pressure and removed by emptying the colon. The history of mucous passages usually make the diagnosis clear.

Colic Due to Abdominal Aneurysm.—Severe paroxysmal pain in the abdomen is sometimes due to aneurysm of the aorta and its branches. It can hardly be diagnosed unless the tumor can be felt. The author recalls an interesting case, occurring in the practice of a colleague, in which severe paroxysmal pain occurred over the appendix. An operation was performed to relieve a possible appendicitis, and the trouble was found to lie in a very small aneurysm of the *left* external iliac artery. It may be well to remind the reader that such lesions differ from ordinary colic in the fact that pain of some degree is rarely absent for any considerable period.

Colic Due to Abdominal Neuralgia.—The lightning pains of

locomotor ataxia or those due to spinal caries must be remembered in this connection.

Recurrent attacks.

Ordinary colic is generally traceable to a manifest disturbance of digestion, is not of frequent occurrence, is relieved by pressure and by emptying the stomach and intestines, and lacks the special characteristics of the more important varieties. From the insurance standpoint any recent paroxysm of abdominal pain, unless unequivocally due to simple acute indigestion, demands postponement, and recurring attacks of whatever sort must be met by postponement, or if thought to be due to graver ailments, by special rating or actual rejection.

Colic due to strangulated hernia would hardly be recognized as such save by actual examination of the hernial openings. Upon this and the opinion of the attending physician the examiner will have to rely.

Lead colic is, of course, most frequently found in those whose occupation involves the handling of lead, such as plumbers and type-setters. Its pain is paroxysmal, diffused over the whole abdomen, and pressure is grateful to the patient. It shows a marked tendency to recurrence, and is usually, but not invariably, associated with obstinate constipation and with the characteristic blue line on the gums.

Renal colic is extremely severe, the pain is referred to the back and along the ureter, often to the inner side of the thigh, there is frequent urination, retraction of the testicle, usually bloody urine, and possibly a history of the passage of calculi. Such attacks prostrate the individual and rarely pass without a physician's attendance. The examiner should in all cases inquire carefully into the medical attendant's expressed opinion as to the diagnosis, and, if possible, communicate with him.

Appendicial Colic.—Certain rare forms of appendicitis are at the onset only to be distinguished from renal colic by the condition of the urine. Severe pains in the back or on the right side, extending along the ureter to the perineum, dysuria, and retraction of the testicle may be present, but an examination of the urine quickly determines the question. The subsequent history would, of course, clear up the diagnosis. It is well to remember that marked tenderness at McBurney's point may occur when a calculus is in the lower portion of the ureter.

Colic Due to Gastric Ulcer.—The pain of gastric ulcer may be more or less persistent, but is more frequently sudden and severe. If characteristic, there are two points of maximum intensity—viz., the back, at the tenth dorsal spine, and mid-epigastrium. Curiously enough, pressure is frequently grateful to the patient during the acute attack though the opposite may be true between attacks.

Dyspepsia, hematemesis, and anemia are the most characteristic symptoms.

This very brief résumé will serve to emphasize the necessity for a particularly careful investigation of the kidney, liver, appendix, hernial openings, and vessels of the abdomen in applicants presenting colic as a symptom.

Convulsions.—(See Tremor and Convulsive Seizures.)

Cough (Palpitation, Catarrh).—"*Are you now or have you ever been subject or predisposed to cough, expectoration, difficulty of breathing, palpitation or catarrhal diseases?*"

Necessary data.

The company desires to know whether the applicant has had cough of a chronic sort or frequent attacks of bronchitis. Whether such cough was dry or accompanied by expectoration; if the latter, its character, and whether there is or ever has been dyspnea upon exertion or occurring in paroxysms. The former suggests a weak heart; the latter, asthmatic seizures or uremia.

Palpitation of the heart may have been trivial and temporary, or severe and long continued, indicating a trifling dyspepsia on the one hand, or serious organic heart disease on the other. (See Palpitation.)

By catarrh is meant a severe or persistent nasal catarrh tending to impair the health of the individual. It is frequently necessary for the examiner to investigate such conditions with the mirror.

The term "catarrh" is not infrequently used as a cloak for more serious ailments.

Deafness.—(See Physical Defects and Deformities.)

Debility (General Debility).—Any admission by the applicant that he has been a victim of this vaguely stated condition demands a careful investigation. It may develop that he was simply "worked out" for a few days, and needed a tonic; or, on the other hand, it may be evident that he suffered from a serious physical or nervous breakdown. In the author's experience the

term has been used to cover cases of pulmonary tuberculosis, acute nervous exhaustion, and delirium tremens following a spree of nearly a week's duration.

Deformities.—(See Physical Defects and Deformities.)

Delirium.—This is generally presumed to refer to delirium tremens, but may serve to recall to the applicant's mind some severe illness which he had forgotten.

Diabetes.—Granting that sugar *may* be present in the urine of healthy individuals, this must be rarely the case, and the cause is easily and directly traced to the ingestion of excessive amounts of grape-sugar or to the use of certain drugs, as ether, turpentine, phloridzin, or chloroform. Aside from such causes, any urine reacting to the ordinary test for sugar is pathologic. Any persistent trace of sugar must increase the risk, whether the case be regarded as lipogenic or dietetic glycosuria, or as true diabetes. Significance of glycosuria.

Even those cases in which the ingestion of large quantities of grape-sugar is affirmed must be regarded with suspicion, and should be repeatedly tested at different times of the day, and postponed for a safe period. (For a discussion of this subject, see Examination of the Urine.)

Diarrhea and Dysentery.—An occasional attack of simple diarrhea or acute dysentery from which the applicant has fully recovered is unimportant.

Chronic diarrhea or dysentery or attacks so frequent as to suggest special susceptibility or a chronic disturbance of the intestinal tract are generally regarded as bars to insurance of the cheaper kinds. The word dysentery should not be used to cover a simple diarrhea, as is often done by the applicant, and, on the other hand, the examiner should remember that the victims of rectal cancer or tuberculosis often regard their troubles as merely a "dysentery."

After our Civil War there were many cases of chronic dysentery among the survivors, and the Spanish War has left many similar cases in its train.

Difficulty in Breathing.—(See Asthma.)

Difficulty in Passing Water (Dysuria).—"*Have you any difficulty in passing water?*" "*Do you habitually rise at night to void urine?*" These two questions are of great importance.

Dysuria, if present, should be carefully investigated, and usually impairs the risk.

Importance and significance.

Most men who rise at night to pass urine state that this is a mere habit, but one must remember that in interstitial nephritis or prostatic hypertrophy the condition comes on so gradually that it may be readily mistaken for habit by the applicant. In every case of such increase, and indeed in any case of dysuria, a chemic and microscopic examination of the urine should be made and a further investigation may be requested by the company.

"Prostatics" are impaired risks, and the same may be said of all persons presenting these symptoms. Postponement during continuance, short term endowment, or absolute rejection must be the rule. (For further discussion, see Examination of Urine.)

Often impairs risk.

Discharge from the Ear (Otitis Media).—A discharge from the ear should always be carefully noted and fully investigated. It is sometimes due to a slight eczema of the external auditory canal. When due to past disease of the middle ear, if the attack be remote and the discharge has altogether ceased, and if there be no pain at any season or after exposure to cold or drafts, there is no serious impairment; but if there be any discharge present, or a history of recent or recurrent discharge, the hazard is very considerable. The author has known of many cases of purulent meningitis due to the lighting up of an old suppurative otitis, and insurance records prove that such impairment necessitates special rating or rejection.

Dizziness and Vertigo.—Dizziness or vertigo may be trivial or serious. Repeated attacks or a persistent vertigo must always be regarded as an indication of some important physical impairment.

Vertigo may be due to indigestion or lithemia, to arteriosclerosis, errors in refraction, neurasthenia, anemia, weak heart, cerebral congestion, cerebral anemia, to excessive use of alcohol and tobacco, or to sexual excesses. It may follow apoplexy or cerebral embolism, or may be due to Ménière's disease, Addison's disease, Bright's disease, paresis, or to various drugs, such as quinin or the salicylates. In Ménière's disease (auditory vertigo) there are tinnitus aurium, vomiting, and progressive deafness, and the patient falls usually to the right or left, the direction generally corresponding to the deaf side.

Ménière's disease.

It is unnecessary to go into an extended description of the different causes of this condition; for the essential feature, from a life-insurance point of view, is the question of frequency and permanence of the attacks. If they are recent, recurrent, or associated with other indications of disease, the risk is impaired. The foregoing points must, therefore, in every way be fully investigated and the facts reported. It may be true that vertigo is usually unimportant, as pointing merely to temporary disturbance of digestion, but the statements of some writers upon this point are scarcely in accord with the best medical opinion, and tend to produce too light an estimate of the gravity of the symptom. The author's personal experience has led him to regard persistently recurring or chronic vertigo as a very important matter.

Risk is impaired.

Dropsy.—Edema, if present in any portion of the body, calls for rejection. It may be due to anemia, to weak heart from whatever cause, to obstructed portal circulation, to Bright's disease, or locally to varices or to pressure upon a venous trunk. That curious temporary edema affecting the face and extremities (angioneurotic) and accompanied by digestive disturbance may be disregarded if the diagnosis be clear. So, also, a history of true edema due to acute Bright's disease may be disregarded if a complete cure be shown and the actual disease is very remote.

In renal edema the swelling does not usually follow the law of gravitation, but appears first in the eyes. Edema due to cardiac weakness does follow the law, and is generally first found in the lower extremities. That due to cirrhosis of the liver or to thrombosis of the portal vein is usually manifested at first by ascites, with a later involvement of the lower extremities in severe cases.

Renal, cardiac, and hepatic.

Evidence of past severe edema or ascites is often present in the shape of striæ upon the surface of the abdomen. In men or in a woman who has never borne a child such striæ point conclusively to some very great enlargement of the abdomen at some former period, and if the applicant be not at the time of examination very obese, one may assume as probable a great loss of weight or the absorption of an ascitic accumulation. Both are, of course, very important deductions.

Importance of striæ.

Drug Habit.—"*Do you now or have you ever habitually used morphin, chloral, or cocain?*" Any drug habitue is a poor risk, for obvious reasons, and nowadays we find a considerable

number who are habitual users of cocain because of catarrhal affections of the nose and throat. Oftentimes, these victims are wholly unaware of their danger, and would indignantly deny the formation of a habit. In confirmed opium or cocain users one is not likely to get a frank confession, but must be guided by their appearance and manner, which have been fully described under another heading. (See Rôle of Inspection.) Such men are habitual liars, and may be craftily secreting and using the drugs when begging with tears in their eyes to be freed from their slavery, and asserting that they will conform in every particular to directions. An application furnished by such a person would be utterly worthless as a record.

Demands careful investigation.

Dyspepsia.—Slight temporary disturbance of digestion unassociated with evidence of organic disease is generally regarded as of little importance, but severe chronic dyspepsia is a bar to insurance save under special rating.

One must remember that oftentimes dyspepsia, as a term, covers digestive disorders of very serious import. Bright's disease, gastric ulcer, tuberculosis, cancer of the stomach, and many other important ailments are associated with indigestion, and the examiner must be on his guard lest he too lightly regard the applicant's statement. He should examine his tongue, question him closely as to loss of weight, and, if he be quite certain that the condition is unimportant, should state that fact clearly and unequivocally upon the application blank. Failing to do this he is sure to receive an inquiry from the home office.

Edema.—(See Dropsy.)

Pupils.

Eyes.—(Color of eyes, see Identification.) "*Are the pupils nearly or quite equal, and do they react to light and accommodation?*" This important question is omitted from nearly all examination blanks.

A slight variation in the pupils may be observed in healthy persons, but any marked difference in the size or in their response to light is indicative of local or general disease. A slight transitory variation is said to occur in tuberculosis and marked variations, due to pressure upon the sympathetic, are found in certain cases of aneurysm.

Significance of abnormalities in reaction.

Abormalities in response to light and accommodation point to locomotor ataxia, aneurysm of the aorta, general paralysis of the

insane, cerebral syphilis, and brain tumor. A markedly contracted pupil occurs in locomotor ataxia and in morphin habitues when under the influence of the drug. In short, any marked inequality of the pupils or any considerable disturbance of the pupillary reflexes points to serious organic disease. If some local cause be present, such as past iritis, or if old injuries be accountable for pupillary abnormalities, they should be carefully investigated and fully explained.

Fainting.—Syncope may be due to organic heart disease, to nervous disturbance, either central or reflex, to anemia, or to hysteria. If the attacks be remote or extremely rare, and unassociated with anemia, hysteria, or organic disease, they need not be considered, but it must be borne in mind that fainting is the name often given to epileptic and uremic seizures, and also to those sudden attacks of vertigo or transient unconsciousness due to minute cerebral hemorrhages.

Fistula.—No person suffering from fistula in ano or, in fact, from any form of fistula is insurable at ordinary rates during its continuance. If it be remote and entirely cured, and if the applicant be physically sound and free from all suspicion of tuberculosis, personal or ancestral, he may be granted a policy. In any case where fistula, past or present, is reported the examiner should satisfy himself as to the actual condition of the rectum. Oftentimes what is reported as fistula proves to be simply an anal fissure or inflamed pile—removable affairs of comparatively little consequence. Impairs the life.

Fits.—(See Tremor and Convulsive Seizures.)

Glandular swellings may be due to syphilis, malignant disease, tuberculosis, leukemia, Hodgkin's disease, gonorrhea, or simple adenitis. Syphilis may leave behind it multiple or even universal glandular enlargement. Most often one finds persistence of the enlarged suboccipital and epitrochlear glands. Enlargement of the latter has long been considered almost pathognomonic of syphilis, present or past, but Cabot's investigation would make this more than doubtful.* It must be remembered that eczema of the scalp may cause enlargement of the suboccipital glands, and that a scar in the groin points rather to a past chan- Various causes.

* R. C. Cabot, "Philadelphia Med. Jour.," 1899.

croidal or gonorrheal bubo than to syphilis. Septic inflammations of the ear often leave their marks in glandular swellings about the mastoid. Malignant disease causes involvement of adjacent lymph-glands. Mammary cancer is often indicated by enlarged axillary glands, or by the involvement of the lower glands of the anterior cervical group. So, also, cancer of the lip affects the tributary lymphatics; and, indeed, whatever organ is involved tends to infect its tributary lymph-chains. In syphilis, malignant disease, or Hodgkin's disease, and in enlargement of the glands due to local irritation, suppuration and its resulting cicatrices are usually absent. In tuberculosis one ordinarily finds a history of painful glandular swelling, usually unilateral, involving the submaxillary and anterior cervical chains, and, by preference, the anterior group. In such an adenitis there is generally, though by no means invariably, suppuration, which leaves behind it depressed irregular scars or the cleaner cicatrices indicating operative procedure. Lymphatic leukemia is associated with general glandular involvement, and the blood will show the characteristic increase in the lymphocytes. The glands are usually not painful nor do they tend to suppurate. Hodgkin's disease may be associated with an almost universal glandular involvement, but suppuration is rare, the glands tend to form soft elastic masses, especially in the posterior cervical triangles, and the axillary and inguinal glands may be similarly involved. Unlike tuberculosis, there is commonly bilateral involvement. The blood is perfectly normal save for a variable degree of anemia. The acute infectious diseases, such as scarlatina, diphtheria, and erysipelas, are accompanied by glandular involvement, which may in some degree be permanent; such swellings are usually in the cervical triangle, and those associated with scarlatina are especially prone to suppurate.

Wherever and whenever enlarged glands are found, a thorough investigation is imperatively demanded.

Gold Cure.—(See Liquor.)

Gout.—True gout is not often encountered by the examiner, but if found to exist in an applicant, it impairs the risk.

English usage.

The English companies who have much to do with these cases usually offer an endowment terminating at the age of fifty or sixty years, or issue a straight life policy with an extra repre-

sented by an addition of five years to the age of the applicant or a ten per cent. addition to the premium. (See Insurance of Sub-standard Lives.)

Dr. Marsh's investigations.

The Mutual Life of New York has carefully investigated the mortality in its cases, 48 in number. Its actuary reports a loss four times greater than normal. Of the 15 deaths occurring in this group of 48 risks, the causes are given as follows:

Heart disease,	4	Pneumonia,	4
Bright's disease,	1	Gout,	1
"Dropsy,"	2	Tumor of the liver,	1
Apoplexy,	1	Bright's disease and gout,	1

Although the number of cases is too small to allow of positive conclusions, it is evident that the deaths have in ten cases been due to just those diseases to which gout leads, and it is fair to presume that the fatal issue of the pneumonias was due in part to the same influence.

In his paper Dr. Marsh, Medical Director of the Mutual Life, refers to the report of the Equity and Law Life Office, which shows that though the expected deaths in healthy lives, according to the tables, would have been 13 for the group of 73 cases reported, the actual loss was 21 lives, no one of which reached expectancy.

Dr. Marsh concludes as follows: "The rule of the Company's practice should be, as it has hitherto been, that such persons are uninsurable at ordinary rates and on the plain life plan. If exceptions are made to the rule, they should be fewer and made with more discrimination than hitherto. The cases which might form such exceptions can not be defined, and each must be individually decided by the responsible medical adviser of the Company, but I think they should be limited to the following:

Rules governing acceptance.

"1. There should be entire absence of hereditary tendency.

"2. The first attack shall not have appeared before thirty years of age.

"3. The attacks shall have been very few in number and light in character, and that several years shall have elapsed since the last.

"4. That the person shall not have had gravel, frequent uric acid deposits in the urine, nor symptoms of lithemia.

"5. That the person must be abstemious both in eating and

drinking, and the applicant must have given evidence that he appreciates the necessity for this course of life."

This is an admirable statement of the case. The belief is general that such risks are best accepted only at a large advance in rates, and that the English custom of adding five years to the age, or even ten per cent. to the premium, is entirely inadequate to cover the increased risk. With most careful selection, it seems probable that a twenty or twenty-five per cent. addition would be necessary even in risks carefully selected upon the lines indicated by Dr. Marsh.

Habits.—(See Liquor.)

Headaches.—Headaches may be due to a great number of conditions, such as,—

Disease of the brain.	Auto-intoxication.
Bright's disease.	Syphilis.
Neuralgia.	Chronic otitis.
Nervous headaches.	Nasal catarrh.
Lithemia.	Carious teeth.
Eye-strain.	Uterine and ovarian diseases.
Cerebral congestion.	Anemia.
Chronic mineral poisoning.	Dyspepsia.

Persistence and frequency important.

The occasional headache is generally trivial and unimportant. Persistent or frequent headaches are far more important than the occasional paroxysmal forms. In this connection one has always to determine the following points: *Heredity, frequency and time of recurrence, duration, seat of pain, character of pain, presence or absence of local tenderness, associated symptoms.*

The so-called dyspeptic or bilious headache is usually associated with the symptoms of chronic dyspepsia and is promptly relieved by appropriate remedies directed to the relief of the gastro-intestinal difficulty—*i. e.*, blue mass, etc.—or by hot foot-baths and emetics. Such a headache is often pulsating and

Varieties.

accompanied by nausea. It is irregular in occurrence and duration, usually frontal and congestive in type. It is increased by lowering the head. Vomiting does, however, at first increase pain by producing congestion. In the migrainous or hemicranic headache the pain is unilateral, associated with hemianopsia, often with dilated pupils.

Headaches of lithemia, jaundice, and constipation are similar in type to the dyspeptic form.

Headaches from anemia may be so severe as to suggest even a meningitis.

In malaria we meet with severe headaches of the neuralgic type, usually periodic and relieved by quinin.

Headaches due to nervous exhaustion are usually occipital, deep seated, increased by fatigue, and relieved by sleep. There is oftentimes only a sense of pressure or fullness, but it may in some cases seem to be external or band-like.

The headache due to eye-strain may also be occipital, though it may be felt in any part of the head. Such headaches are generally associated with overuse of the eyes and evidences of eye-strain, such as conjunctivitis, pain, tenderness around the eyeball, or blurred vision in certain movements of the eye.

Rheumatism of the scalp is usually of only moderate severity, and associated with general tenderness of the scalp.

Headaches due to chronic poisoning by drugs, such as chloral, have no distinguishing features.

Headache due to drugs, brain-tumor, uremia, etc.

The dull or throbbing headaches with tinnitus aurium associated with the administration of salicylates and quinin are common and well understood. So also are those due to ovarian and uterine diseases, which are usually at the vertex.

Brain-tumor causes constant headache, usually worse at night, associated with nausea and vomiting, and sooner or later with optic neuritis.

In renal disease one may meet with headaches due to uremic poisoning, and these may simulate almost every form from sick headache to neuralgia. So also there may be congestive headaches present, particularly in cases of interstitial nephritis. Such are to be diagnosed only by the accompanying evidences of Bright's disease. Similar headaches are seen in some cases of valvular disease.

Brain-abscesses may cause very constant and severe headaches, with or without localizing lesions. They usually lack the optic neuritis, and are accompanied by a septic temperature curve.

Nasal catarrh frequently causes a dull persistent frontal headache.

Syphilis produces headaches either from gumma, when the symptoms may closely resemble cerebral tumor, or from a

syphilitic arteritis. Syphilitic headaches are persistent, markedly worse at night, and yield to the administration of iodids.

The headache of neuralgia is too well understood to require extended description. The distribution along known nerve-paths and tenderness on the lines of distribution and at points of emergence from the bony structures are characteristic features. The essential point from an insurance standpoint is the question of *cause*, frequency, severity, and persistence. An occasional neuralgic or dyspeptic headache counts for little, but frequent or persistent headache would lead to postponement of the applicant.

Essential points.

Height.—(See Weight.)

Hemoptysis.—"*Have you ever had spitting or raising of blood or other hemorrhages?*"

The company seeks chiefly for knowledge of a pulmonary hemorrhage, though the question would apply also to cases of hematemesis from gastric ulcer, carcinoma, or cirrhosis, and to the hemorrhages indicative of hemophilia, leukemia, pernicious anemia, or that from the bowels or kidneys. If such are admitted, the most careful investigation is necessitated. *Was the blood raised with cough or vomit? What was the amount and color? The presence or absence of clots. Pain or discomfort attending it. General condition of health before and after the hemorrhage. Circumstances leading to the occurrence of the hemorrhage.* It is generally necessary to form an independent opinion, for the applicant is often entirely ignorant of its origin and significance, the attending physician having probably made every effort to conceal its true character and significance, thinking that a frank statement would unduly alarm the patient.

Conditions suggested by "blood spitting."

All sorts of reasons, usually poor ones, may be advanced to explain what was clearly a hemorrhage from the lungs, but they must be very good indeed, and the hemorrhage very remote or trifling, to convince an insurance company that the risk is a safe one. Whenever possible, the examiner should communicate with the attending physician. Many companies decline all such cases absolutely if there be a history of pulmonary hemorrhage, and even of those that they accept demand at least ten years' immunity from the attacks. Here, as elsewhere, the physique, health record,

Effect upon rating.

and family history will have a prominent place in the mind of the medical director when considering the application. (See also Substandard Risks.)

Hemorrhoids.—(See Piles.)

Hernia.—(See Rupture.)

Hodgkin's Disease.—(See Glandular Swellings.)

Hysteric Tremor.—(See Tremor and Convulsive Seizures.)

Hystero-epilepsy.—(See Tremor and Convulsive Seizures.)

Identification.—(See also Knowledge of Applicant.)

"*Have you properly identified the applicant?*"

"*Do you know him to be the person represented as applying for this insurance?*"

After one has read the chapter devoted to insurance frauds, he will the more readily appreciate the importance of these questions. If the applicant be properly introduced by a friend or by the agent, the examiner's responsibility ends; but if this be not done, and he is a stranger, his identity must be established. An examination of letters or other documents will help to satisfy one on this point, and an excellent plan is to take up the application and rapidly question him as to the portion which has already been filled in, presumably at his dictation. If he be the proper person, he should be able to answer without hesitation.

Proper procedure.

The examiner had better leave an investigation of this kind until he has completed the examination and the applicant has affixed his signature to the application. This forestalls any withdrawal on his part should he be irritated by the necessary inquiries, commits him to a criminal act if he be an impostor, and gives the examiner a signature for comparison. If the slightest doubt remain in his mind after proper inquiry, he should not fail to insist upon a full investigation. It need hardly be said that in a matter of this kind the utmost consideration and courtesy should be shown by the examiner, and every effort made to avoid giving offense. In this, as in many other delicate matters, almost anything can be accomplished by the exercise of tact.

"*What is the color of the eyes?*"

"*What is the color of the hair?*"

"*Is there any scar or deformity?*"

"*What marks of identification?*"

Great care should be taken to answer these questions accu-

rately, for they relate to identification of a different kind, the identification of the dead.

Scars.

Scars are of the greatest importance in this connection, and their character, form, and exact location should be accurately described. It happens, not infrequently, that an insured man or woman disappears and is supposed to be dead. Later, a body may be found which the sorrowing friends and bereaved relatives identify as the person insured. The insurance company, on the other hand, may be able to prove that the body lacks the distinguishing marks described in the application, and thus avoid payment of what may prove later on to have been a fraudulent claim.

"Mysterious disappearance."

One of the most common of insurance frauds is the attempted substitution of the body of some unfortunate waif for that of an insured person, who is perhaps lying snugly hidden until the money shall be paid to an accomplice. The author recalls a case in which the supposed dead man had, when discovered, been established in a far-off State for many months, had taken unto himself a new wife, and was the superintendent of a Sunday-school. If left but a little longer, he would have been sent to Congress by an admiring constituency.

Essential data.

Injuries or Surgical Operations.—All *severe* injuries should be fully reported. The cause, result, treatment, and duration, and the completeness of recovery are all to be carefully investigated and, if important, fully described. Even a slight accident may prove to have been a shooting affray; a "fall" may have been the result of drunkenness or epilepsy. Or, again, an "accidental wound" may have been self-inflicted. As regards surgical operations, the same rule of procedure holds good.

Misleading terms.

An operation may have been for malignant disease, tubercular peritonitis, and many ailments which even if past and remote would make the risk too hazardous for insurance at ordinary rates. Amputation involving the leg above the knee, or the arm at the shoulder-joint, or double amputation of the leg or arm, is generally held to impair the risk. This has always seemed to the author a ruling of doubtful justice. If an amputation were made for disease likely to recur or if the operation had been performed only after a long and exhausting suppuration, one might see the wisdom of such a rule. So also if an amputation has left

Amputation as affecting insurability.

behind it an irritable or inflamed stump; or, again, if for any reason a reamputation were likely to be necessitated or locomotion were to be seriously interfered with, one can understand the danger underlying an acceptance of the risk. But that the mere fact that an amputation has been made at the shoulder-joint or thigh will shorten the life of a man previously sound and promptly recovered from his operation seems doubtful. Such an idea belongs to the preantiseptic era, when tedious after-treatment and prolonged and exhausting suppuration were the rule. In all cases the examiner will report upon the character of the stump and the interference with locomotion.

Insanity.—No person who has ever been temporarily insane is insurable at ordinary rates. In an examination one should be especially careful to note any evidence of incipient insanity, especially the curiously expansive ideas of paresis or the depression of early melancholia. (See The Rôle of Inspection in Diagnosis.)

Insurable Interest.—(A discussion of this important point will be found under Sex.)

Intemperance.—(See Liquor.)

Jaundice.—Jaundice is merely a symptom, and may be classed as (*a*) obstructive, (*b*) toxemic, (*c*) emotional. As a symptom it is associated with a large number of diseases. One of the most curious cases the author has ever seen was that occurring in a man after a violent fit of anger induced by a domestic quarrel. According to his story, an exchange of hard words was followed by a lively fusillade of kitchen utensils and tableware, from which he emerged victorious, but as yellow as saffron. This would certainly be classed as emotional jaundice.

Curious case.

The following conditions are suggested by jaundice: gall-stones, hepatic cirrhosis, hepatic abscess, new growths causing obstruction, duodenal catarrh, stricture of the common duct or stenosis from any cause. Sallowness and jaundice should not be confounded.

Conditions suggested.

The yellow color of skin and mucous membrane is particularly marked in obstructive jaundice. It is made more apparent if the skin or mucous membrane be made tense or if a glass slide be pressed down upon it. The ocular conjunctiva often shows the icteroid tinge even if it be not present elsewhere. If jaundice be

present in an applicant for insurance, he is ordinarily postponed until it has disappeared. If there be a history of biliary colic, a long postponement is the rule, and the passage of stones should be inquired about.

Important data.

In all cases careful investigation is indicated as to the condition of the digestive tract, the size and consistence of the liver, the presence or absence of ascites, and the condition of the superficial veins. In women floating kidney may be accompanied by attacks precisely like gall-stone colic, even to the occurrence of jaundice, though this symptom is generally absent. (See Colic.)

Malignant disease, syphilis, and malaria.

If malignant disease be present, one may find a tumor or a definite cachexia. Loss of weight is especially important, and is often suggested by a relaxed skin even if other evidence be wanting.

Syphilis should be remembered and a careful examination made of the epitrochlear, inguinal, and suboccipital glands, as well as of the skin, for evidence of some of its cutaneous manifestations. The urine should be tested for bile pigment.

A sallow skin without true jaundice is found in malaria and in many of the chronic exhausting diseases. A lemon tint without true jaundice is almost pathognomonic of pernicious anemia. A curious fawn color occurs in certain forms of Bright's disease; an earthy tint, in cancer of the stomach; a dark yellow tinge, in chronic malaria, etc. (See the Rôle of Inspection in Diagnosis.)

Kidney Trouble.—Many a man will say that he has had bladder or kidney trouble when he has never had anything of the kind. It is well known that the passage of urates is regarded by the laity as an indication of serious kidney trouble, while the presence of a phosphatic sediment leads to the erroneous belief that seminal losses are occurring, and if at the same time the victim has a little backache, his diagnosis is complete.

Often imaginary.

The examiner should try to satisfy himself as to the exact nature of the ailment to which the applicant has given the name of Bright's disease, and whenever possible should refer to the attending physician. Acute Bright's disease, if occurring before the age of thirty, very remote and fully recovered from, does not necessarily affect the risk, and the same may be said of a

Remote acute nephritis.

past pyelitis, or of those transient forms of albuminuria due to excessive physical exertion, dietetic faults, acute infectious diseases, or other removable conditions.

In every case, however, no matter how remote, if albumin has ever been present, the urine must be repeatedly examined for both albumin and casts before the applicant can be pronounced a safe risk at ordinary rates.

Important associated signs.

It is, of course, necessary that in all cases the character of the pulse, heart-sounds, and cardiac area be carefully determined. A pulse of high tension, an unduly accentuated aortic second sound, a left border beyond the nipple line, or an apex-beat displaced downward and to the left are frequently associated with chronic interstitial nephritis, and, these symptoms being present, even if albumin were lacking in the urine, the risk would be impaired. This subject will be more fully dealt with in the chapter upon Examination of the Urine. (See also Substandard Lives.)

A strange omission.

Knee-jerks.—"*Have you tested the knee-jerks? and are they normal and alike on both sides?*"

This question appears in but one or two examination blanks, and there can be no doubt that companies are continually insuring cases of incipient locomotor ataxia at ordinary rates.

Patellar reflex.

The patellar reflex is practically always present in health, and its absence points especially to locomotor ataxia, though it may be due to peripheral neuritis, poliomyelitis, advanced diabetes mellitus, and any and all diseases involving the posterior columns of the cord, or the second, third, and fourth posterior nerve-roots of the lumbar segments. The author has several times found it to be lacking in aneurysm of the aorta, and it is said to be lost immediately after an epileptic attack. It may be that it is at times absent in health, but this is more than doubtful, its absence being more probably due to imperfect technic. In making the test, in order to give an applicant the benefit of the doubt, the examiner should be sure that the legs hang free from the knee; have the patient look away, and, clasping his hands together, pull vigorously at the word, which is given simultaneously with the tap upon his patellar tendon. The reflex should not be reported *absent* until the examiner is satisfied that no muscular resistance is acting to prevent the movement.

Knowledge of Applicant.—(See also Identification.) "*How long have you known the applicant?*" The examiner answers, "stranger," "introduced by agent," or states the length of time he has known him.

The company would naturally feel more confidence in the physician's opinion as to the applicant's habits and in his own statements if the reply should be, "well and favorably for many years," than it would if he were a "stranger," or but "slightly" known. It may be well to state here that all companies scrutinize closely applications from men who are examined in towns other than their own place of residence, and will almost always thoroughly investigate such cases through confidential channels. This fact should serve to put the examiner on his guard, and suggest the necessity for a particularly careful examination in such cases. Employing an outside doctor for an insurance examination is a favorite device of the unfit whose ailments are too well known to the physicians of their own town.

Examination of nonresidents.

Lead Colic.—(See Colic.)

Liquor, Use of.—"*Use of ardent spirits; extent; average quantity each day.*"

"*Do you use ardent spirits, wine or malt liquors? If so, to what extent? average quantity each day?*"

"*Have you ever taken any cure for intemperance?*"

"*Are your habits at present and have they always been sober and temperate?*"

"*Have you ever used intoxicating liquors to excess?*"

"*Have you ever been intoxicated?*"

After reading the foregoing questions no one will doubt that insurance companies regard intemperance with great disfavor. The cross-questioning would seem to be sufficiently searching to elicit all important facts, yet this is far from being true in all cases. In the first place, a man will seldom admit intemperance, either past or present; and in the second, he will very often fail to understand the meaning of the word. *In every case the examiner must see that an average is stated;* and no matter how infrequent are the applicant's potations, his custom can always be expressed in such a form. "Twenty drinks a day," "a drink a week," "a drink a month," are expressions that convey a definite meaning. Avoid the use of such terms as "occa-

Average must be given.

sionally," "very seldom," "social drinker," "drinks when he feels like it," "now and then," "often not for a month," "very rarely," "no habit." These convey no positive information, and fail to protect the company. "Social drinker" may meet forty friends a day. A man who has "no habit" may have never stopped drinking long enough to test the question. The man who drinks "when he feels like it" may always experience that feeling. "Now and then" is capable of indefinite multiplication. "Often not for a month" may, and often does mean, that thirty days is the regular interval between sprees. "Occasionally" means whatever a man chooses to consider the definition of the word. There are many kinds of drinkers, and between beer and spirit drinker there is little to choose, provided the amount consumed be excessive. The man who takes his spirits on a full stomach is infinitely to be preferred to him who pours cocktails or other spirits into an empty one.

Avoid indefinite terms.

The steady drinker is perhaps less dangerous, within limits, than is the spree drinker. Worst of all is the sneak drinker, the man who, unsuspected by any one save, perhaps, his wife, takes a bottle of whisky to his room and drinks himself into insensibility.

"Steady" "spree" and "sneak" drinkers.

Insurance companies are extremely suspicious of recently reformed drunkards, and upon applications for straight life policies, Keeley graduates are in most cases rejected absolutely, though some companies accept after the lapse of five years. About the same term would be exacted in the case of any reformed drinker, and if the family history be tainted by alcoholism, he should *never* be accepted save as an impaired risk, for such men almost invariably relapse. In all cases the examiner should investigate the heart, liver, kidneys, and blood-vessels with especial care, and let no false delicacy prevent him from getting at all the facts.

"Keeleyites."

Generally speaking, a man who regularly takes his stimulant four or five times a day is hardly to be considered a first-class risk, though his age, nationality, family history, occupation, environment, general reputation, and the time and manner of indulgence must always be considered.

Lumbago.—True lumbago, or myalgia, is of little importance from an insurance point of view, and if the history of the disease so termed by the applicant shows that it followed exposure to

cold; that the pain was distinctly localized, increased by muscular movement, and relieved by rest; that the muscles were tender and sore to the touch; and, further, that recovery was prompt and complete, one may regard it as of little importance. It is true, however, that many more serious ailments masquerade under this title, and one must always bear in mind that renal colic, Bright's disease, acute or chronic pyelitis, mucous colitis, uterine and ovarian disease, chronic sciatica, abdominal aneurysm, spinal caries, locomotor ataxia, and other important ailments may present pain in the back as a prominent symptom. Persistent backache or loin weariness in men of middle age is, in the author's opinion, a symptom of decided importance.

Necessary data.

Loin weariness

Lymphatic Leukemia.—(See Glandular Swellings.)

Malignant Disease.—(See Glandular Swellings and Rôle of Inspection in Diagnosis.)

Masked Epilepsy.—(See Tremor and Convulsive Seizures.)

Muscular Cramps.—(See Tremor and Convulsive Seizures.)

Nasal Polypi.—If present, disqualify during their continuance, and even after removal until such time has elapsed as will indicate freedom from the danger of recurrence. Whenever they are reported, an examination of the nasal cavities is demanded. Slight grades of nasal catarrh are unimportant, but, as previously stated, "catarrh," as used by the applicant for insurance, may cover other and much more serious ailments, even pulmonary tuberculosis.

Hay-fever.

Hay-fever may or may not impair the risk. Cases must be judged individually, and should be fully explained.

Often a cloak for more serious ailments.

Nervous Exhaustion ("**Nervous Trouble**").—Severe attacks of true neurasthenia should be considered as constituting impairment, unless they be remote, fully explained, and entirely cured.

It is interesting to note how frequently this term covers insanity, delirium tremens, chronic alcoholism, or organic disease. Several times it has been associated with a sojourn at some Keeley cure. In all cases the cause, duration, symptoms, and other important matter should be fully investigated and reported.

Neurasthenia.—(See Nervous Exhaustion.)

Otitis Media.—(See Discharge from the Ear.)

Palpitation.—Palpitation, if recent or if present at the time of examination, should lead to postponement. The condition is very generally due to dyspepsia and a functional nervous derangement, but, on the other hand, it may be an evidence of some very dangerous cardiac or cerebral disorder. Often trivial and unimportant.

Age.—In a young person it is usually temporary and due to removable causes, such as dyspepsia or overuse of tobacco. In an old person it is to be regarded with suspicion. If it be increased or initiated by physical exertion, it is very likely to have a cardiac basis, such as mitral disease, a dilated or fatty heart, or coronary arteriosclerosis.

Paralysis.—One of our insurance authorities states that every case of hemiplegia or paralysis, however remote, makes its possessor ineligible for life insurance ; but this statement is far too sweeping.

Infantile paralysis from which a partial or complete recovery has been made ought not to debar a man from insurance, providing locomotion is not so greatly interfered with as to make him unduly liable to accident. As regards degree of impairment, these cases must be decided individually. The author is quite sure that persons who have had this disease and reached maturity sound in all other respects will live just as long as any other group of risks. Infantile.

Bell's palsy affecting only the nerve-trunk, and followed promptly by complete recovery, should not act as a bar to insurance, though one should demand that a long period have elapsed. On the other hand, one should regard with suspicion cases occurring with loss of consciousness, mental confusion, vomiting, hemiplegia, difficulty in swallowing, ptosis, or strabismus, and carefully test the pupillary reflexes ; indeed, any of these latter symptoms constitute good evidence of serious impairment. Bell's palsy.

Syphilis as a cause must be borne in mind, and whenever possible, the attending physician should be interviewed.

Many forms of local paralysis for which a definite local cause may be assigned need not affect insurability. Such are scrivener's palsy and traumatic neuritis. On the other hand, a ptosis or paralysis of one of the ocular muscles, unless the condition has been present from birth, materially increases the hazard. The Local paralyses.

essential point is, that an examiner should bear in mind that all cases of paralysis are regarded with suspicion by medical directors, and should in all cases investigate and report along the lines here laid down.

Paralysis Agitans.—(See Tremors and Convulsive Seizures.)

A pension paradox.

Pension.—"*Are you seeking or have you ever applied for a pension? If so, when, where, and upon what grounds?*" This might be thought a humorous question, for one would not suppose that a person who drew or applied for a disability pension would offer himself as a candidate for insurance. Such is, nevertheless, the case, and frequently we find that men who, according to their application, are perfectly sound are, nevertheless, drawing a monthly stipend for a disability which in its items may comprise half the ailments to be found in a modern work on the practice of medicine. The author recalls one case in particular, which, when investigated, seemed positively to establish the fact that the applicant was dead. No man certainly could have lived for any length of time with the diseased heart, kidney, liver, and stomach that afflicted him at the time he applied for a pension; all of them being ingeniously traced to an attack of "bleeding piles" incurred by the "hardship and exposure incident to army service."

Such cases are usually declined, but some men draw pensions upon grounds that would not constitute a bar to insurance.

Petit Mal and Masked Epilepsy.—See Tremors and Convulsive Seizures.)

Physical Defects.—"*Has the applicant any physical defects or deformities?*"

Both cause and effect important.

Blindness constitutes impairment, if it be progressive, due to cataract, or sufficiently marked to make the applicant especially liable to accident. It may also be due to Bright's disease, diabetes, brain-tumor, or syphilis, and were it practicable, it would, no doubt, be an advantage to the insurance companies if all applicants underwent an examination of the *fundus oculi* with the ophthalmoscope; but this is not practised ordinarily, nor are the majority of physicians sufficiently skilled in the use of this instrument to carry out successfully so exacting a procedure.

Deafness, if marked, also impairs the risk. The cause of deafness should in all cases be carefully investigated.

Deformities, if extreme, are considered causes for rejection. Af-

fecting the spine, slight lateral curvature may be disregarded, as may that form of curvature seen in persons who, though markedly round shouldered from occupation or faulty position during adolescence, are otherwise first-class risks; but marked deformity prevents acceptance of the risk upon ordinary terms. One may, at first thought, believe that many hunchbacks reach old age, but the author's experience has been such as to convince him that they very rarely reach sixty years of age. They are, as a rule, feeble in constitution, their condition in itself tends to prove a past tuberculosis, and the abnormal position of the vital organs combined with the feeble resisting power of the body-tissues make them fall easy victims to acute disease of the chest and abdomen.

"Hunchbacks" die early.

The author, personally, would place cured hip-joint disease in the same list. Some who are so afflicted live to old age, but the majority are delicate men, who die short of their expectancy, and should never, in the author's opinion, be granted any insurance, save for short terms and at high rates.

Hip-joint disease and infantile palsy.

Deformities resulting from infantile paralysis are quite different, and applicants should receive their insurance without regard to the deformity, if it does not seriously interfere with locomotion.

Amputation.—Deformities of this sort may be disregarded if the amputation has been single, and not above the knee or through the shoulder-joint, and if, in the case of the lower extremity, a properly fitting artificial leg is used. One should always determine and report the cause of the amputation and carefully examine the stump, to be certain that no further operation is likely to be required, and that no irritable stump threatens the applicant's general health.

Cause, site, condition of stump.

If an amputation had been undertaken for the removal of a malignant growth, for example, the applicant could not be favorably considered. (See Injuries and Surgical Operations.)

Physical Development of Applicant.—Weight, height, chest measurement, waist measurement. (See Weight and also Measurement.)

Piles.—If severe and inflamed, the applicant will be postponed. So also if there be bleeding piles, unless the hemorrhage is extremely slight, occurs at rare intervals, and is seen only when the bowels are very greatly constipated. In all cases of doubt a rectal examination is likely to be requested. Not infrequently, a

Often miscalled.

mere fissure readily curable is called a pile, or, again, it may prove to be a name given to a harmless tab, while, on the other hand, rectal prolapse, actual fistula, syphilis, or malignant disease may be present. In most cases a cure by operation renders the risk eligible for any form of insurance after a proper term of immunity.

Pleurisy.—Pleurisy is under grave suspicion at the present time, and it can be said with some emphasis that a large percentage of true pleurisies are tuberculous. This is true even in many of these cases coming on in healthy persons, and still more so of those occurring in persons who are out of health.

Osler says,* "I confess that the more carefully I have studied the question, the larger does the proportion appear to be of primary pleurisies of tuberculous origin." He also emphasizes the fact that the large percentage of cures is quite in accord with our experience in the treatment of local tuberculosis. Some French writers place the proportion of tubercular pleurisies as high as 70 or 80 per cent. Osler found 32 tuberculous cases out of 101 pleurisies of all kinds that came to autopsy. Allowing for unavoidable error, it would seem likely that from one-third to one-half of all pleurisies represent infection with the tubercle bacillus, and it follows that insurance companies should look upon the condition as one requiring a long period of postponement or a special rating. Those complicated by empyema would, of course, be especially serious, and it may be doubted whether they can ever be safely granted a life policy at the lowest rates. Much, however, must depend upon the cause, duration, promptness of recovery after operative interference, and the result as shown by the condition of the lung at the time of examination. (See Tuberculosis and Substandard Lives.)

Largely tuberculous.

Empyema.

In such cases one has to consider the effects of prolonged suppuration upon the constitution of the individual as well as the question of adhesions and lack of functional activity in the affected lung.

Expansion and extent of adhesion is readily determined by the result of percussion of the lower borders of the lung, in full inspiration, as contrasted with that of full expiration, and also by observing the diaphragm phenomenon (Litten's sign) with which

* "Practice of Medicine."

the examiner should be familiar. The former procedure is very easily practised upon the right side, because of the assistance offered by the liver dullness. Upon the left side the superficial cardiac area in front and the renal dullness behind offer a means of determining the excursion of the anterior and lower borders of the lungs. Percussion of the apex posteriorly is helpful in the same way in determining the presence or absence of adhesions in that region. The ordinary signs of adhesion are, in addition, percussion dullness, obscure or distant breathing, lost or greatly diminished breath-sounds and vocal fremitus. (See Examination of the Lungs.)

Pleuritic adhesion.

Pneumonia.—When an applicant states that he has had pneumonia, the examiner should question him carefully as to the symptoms in order to satisfy himself that the illness is properly named. If recent, it should be regarded as a case for postponement or special rating. If recurrent, it is unlikely that anything but a short endowment could be safely granted.

Polypi.—(See Nasal Polypi.)

Privacy.—*Examination of applicant; place; whether in private or in the presence of a third party.*

An absolute necessity.

"*Have you examined the applicant in private and in a quiet place?*"

"*Are you alone with the applicant?*"

"Yes" should be the invariable answer. As has been previously stated, one must never attempt an examination when other parties are within hearing, and it is equally true that no proper examination can be made save in a quiet place. The reasons are obvious. No man is likely to talk freely of his most private and personal affairs within the hearing of a third party, nor can any physician make a proper examination of the heart and lungs if his ears are assailed by extraneous sounds. If any agent should presume so far upon the good nature or inexperience of the physician as to indicate that it is his intention to remain in the room during an examination, he should be courteously but firmly dismissed.

Pupils.—(See Eyes.)

Race, Place of Birth.—It is a curious fact that certain races are peculiarly susceptible to particular diseases.

Negroes.

The negroes of this country are not regarded as safe risks save in

exceptional cases. All medical men know of the great prevalence of syphilis among the colored people, and still more remarkable is their tendency to tuberculosis. This, again, is particularly true of those of mixed blood, among whom the mortality from this disease is excessive. Many companies do not insure them at all, others accept individual cases, and some demand in all cases an extra premium.

Germans, Hebrews, and Britons.

Deaths from suicide are much more common among people from the continent of Europe, Germans especially.

Hebrews are peculiarly susceptible to diabetes.

The English are apt to show diseases resulting from gout or gouty inheritance, chiefly of the heart and blood-vessels.

Orientals.

The Chinese are, as all know, addicted to the use of opium, hard to identify, and lead in this country a most unhygienic life. So far as the author knows, they are not accepted by any company.

Reflexes.—(See Knee-jerks and Eyes.)

Rejections, Previous.—*Has a policy or certificate ever been applied for which was not thereafter issued, or which, if issued, was modified in amount, kind, or rates? If so, in what company or association, and when? Or has any physician given an unfavorable opinion upon your life with reference to life insurance, formally or informally, with or without your making application?*"

Rejected applicant tabooed.

Generally speaking, a man who has been refused by one insurance company is likely to be refused by all others, yet, occasionally, it happens that what constituted the reason for rejection was based upon manifestly erroneous findings, or upon some cheap plan that would require a higher standard of insurability than would be thought necessary to admit of the issuance of a more costly policy or one of shorter term.

Some companies decline positively to consider the application of any one rejected by another within two years.

Futile dishonesty.

It is surprising to note the frequency of attempted concealment of a past rejection. This is usually a foolish move as well as a dishonest one, as all companies unite for self-protection, and it is extremely difficult for a man to deceive any of them in this particular matter. The fact that such concealment is of frequent occurrence often places the careless examiner in a most unfortunate position. He may examine some high-colored, apparently robust applicant, and without a careful scrutiny recommend him

as a first-class risk. A few days later he may receive a polite note suggesting the advisability of a re-examination in view of the fact that this individual has recently been rejected by some other company, whose examiner reported valvular disease of the heart. It is extremely difficult to make such mistakes appear in a favorable light at the home office. Hence, the examiner should be on his guard.

Renal Colic.—(See Colic.)

Rheumatism.—The examining physician should always clearly state the form of rheumatism from which the applicant has suffered, the date of its appearance, the joints affected, the duration of illness, the presence of heart complications, and the applicant's susceptibility to rheumatic attacks of any kind at the time the application is made. One attack of inflammatory rheumatism calls for a postponement of at least two years, and for a period of complete immunity from all rheumatic symptoms. Repeated attacks call for rejection of the risk or special rating. If the family history showed a decided rheumatic taint or if the occupation and environment were such as to favor the incidence of rheumatic attacks, the applicant would probably be granted endowment insurance only, even though he had suffered but one attack.

Essential data.

Rules governing acceptance.

The more severe the attack, the longer should be the term of postponement. It is always well to inquire as to whether any surgical treatment was necessitated. A man may report no complications, yet the examiner may find that he has had his pericardium aspirated, or that an operation was performed for the cure of a septic or tuberculous joint. Minor rheumatic affections, if remote and infrequent, do not affect insurability if family history and occupation be favorable, and care should be taken to prevent the applicant from reporting some trivial ailment as "inflammatory rheumatism" or "rheumatic fever."

Rheumatism of the Scalp.—(See Headaches.)

Rupture.—"*Is there a rupture? If so, of what kind—single or double, reducible or irreducible?*"

"*Is a properly fitting truss worn?*"

"*If the applicant be admitted, and is now or hereafter becomes ruptured, does he agree to wear continuously a suitable truss?*"

It is said that one in fifteen of the adult males of our population

Frequency.

is ruptured, and that the liability so increases with advancing age that no less than one-third of all old men have a hernia, but this statement is not in accord with general experience. Strangulated hernia is most common in men between the ages of forty and fifty, and especially frequent in those engaged in laborious occupations.

Essential data.

Women are far less liable to this condition than are men, but their hernias, being usually femoral, are more dangerous than those of the male. A hernia being acknowledged, the examiner must satisfy himself by an examination as to the kind, whether it be double or single, reducible or irreducible ; inquire as to any evidence of past strangulation, and satisfy himself that the truss is in place, is properly fitted and worn with comfort. A truss should be worn continuously if possible, two or three being kept for use ; not even in the bath should the ruptured individual discard it. If the applicant be an intelligent man, engaged in some sedentary occupation, even a double hernia, if properly retained, need not unfavorably affect the risk, and he would generally prove a better subject than the laboring man with a single hernia. Some companies do, nevertheless, absolutely reject or demand special rates for double hernia, and the conditions must be very favorable to admit of their acceptance upon ordinary terms.

Double hernia.

Sex (Insurable Interest).—The female sex is not, as a rule, favorably regarded by insurance companies by reason of the following facts :

Obstacles to insurance of women.

(*a*) Examinations are more superficially made in the case of women than of men.

(*b*) Very serious pelvic disease may exist without outward evidence, and women are especially prone to conceal vital facts bearing upon this point.

(*c*) Substitution of healthy for abnormal urine is very easily accomplished.

(*d*) Their insurance has been made in many instances a means of perpetrating a fraud, and has often been the cause of murder.

A notorious case of this sort is fresh in our memory—viz., the murder of Kate Ging by Harry Hayward. (See Insurance Frauds.) For these reasons most companies insure them only upon some such conditions as are outlined in the following quotation from a circular issued by a prominent company :

"*What constitutes an insurable interest in the lives of women?*"

"Experience shows that insurance upon lives, whether male or female, in which no pecuniary interest appears to exist on the part of those who are to be benefited is, in general, a loss to the company, being speculative in character and therefore more hazardous than ordinary risks in which an interest really exists. Insurance upon the life of a husband or father for the benefit of a family, or as security for a debt, is a legitimate transaction, sanctioned and protected by law, and no policy of that description can be altered or changed in any respect without the consent of the company and of the parties legally entitled to surrender their rights therein. An insurable interest exists in the life of a person, whether male or female, upon whose income or earnings a family depends for support. So in the case of insurance by a creditor upon the life of a debtor, to secure the amount of indebtedness, the company acknowledges the interest by mentioning the transaction in the policy itself, otherwise there would be a liability to underwrite upon lives in which pecuniary interest had been extinguished by the statute of limitations or by other operations of law. The remarks apply equally well to all parties applying for insurance; thus, a widow left with a family depending upon her exertions for support is a case clearly insurable, and we believe never objected to. Or a woman persecuted with an idle or dissolute husband may (in some States) contract debts and enter into trade upon her own account for the support of her family. But the relationship alone does not create a pecuniary or insurable interest. In general terms, therefore, no policy will be issued by the company upon the life of any person, male or female, unless there is manifestly an insurable interest on the part of the beneficiaries.

Speculative.

The proper interest.

Debtor and creditor.

Widows and self-supporting women.

"As at present advised, this insurance interest must, in the case of a woman, be founded upon an income depending upon her life, which may come in either of two ways: (1) By property left in trust for her benefit, the income of which expires or reverts to parties outside her immediate family at her decease, in which her husband and children are pecuniarily interested. (2) By her own exertions in the support of her family.

"When such insurable interest clearly exists, no one can be benefited by the death of the insured beyond the amount of that

Interest in the life *vs.* interest in the death.

interest, and there is, therefore, no inducement to fraud. *If the insurable interest is ignored* and policies made haphazard, the *beneficiary has an interest in the death of the insured and not in the life*, and is thus offered a direct incentive to crime. The company takes the ground that insurance in any form is indemnity for loss, and there can be no loss where no interest exists. General agents will understand and bear in mind that fraud is more easily perpetrated in the case of women than in men, because of the peculiarity of many complaints with which they are afflicted, and when concealment of the fact is so possible, it is in itself an inducement for unscrupulous persons to obtain insurance. No application should be forwarded to the company unless it clearly appears that the beneficiary has an interest in the *continuance of the life of the insured*, which bears a proper relation to the interest in her death, which the insurance sought would give."

Some companies exact an extra premium for insuring women, and many decline them altogether.

Women as examiners.

The author is of the opinion that whenever a competent woman physician is available, she should be employed in the examination of these cases. In any event the examination should be made thoroughly, the corset must be removed, and all questions put plainly and directly, in that matter-of-fact manner which is the best possible preventive of undue embarrassment.

Illustrative case.

The author examined a woman some time ago who objected most strongly to removing her clothing; this was insisted upon, and it was clear that she had a soft mitral murmur, and a dilated heart, which would never have been detected with the waist and corset on. A little questioning left no doubt that she knew of its existence, and had deliberately attempted the perpetration of a fraud, relying upon the probability of a superficial examination. She already carried a policy, obtained but a few weeks previously in another company.

The question of relative vitality as between man and woman need not be considered at length, as we are now concerned with *insurability*, and this is affected by the special difficulties already mentioned.

In an interesting and valuable paper, Brandreth Symonds

says, "But one great fact remains inexplicable, and that is woman's greater tenacity of life." *

Scrofula.—This term is nearly obsolete, but in the minds of the laity still has a meaning which the proper term would not convey.

An expression of tuberculosis.

Scrofula is, of course, a physical expression of tuberculosis, and any history of past tuberculous disease of the glands or bones (knee, hip, spine) should call for rejection or special rating unless the applicant be unusually robust, past the age of thirty, and living in a very wholesome atmosphere and favorable environment.

Insurance rating.

In such cases some form of insurance may be granted; but life policies at ordinary rates can not be safely issued. It will strike one, if he thinks the matter over, that while he may be able to name scores of cases of spinal or hip-joint disease in young persons, yet the number of old men or women of his acquaintance having deformity following such healed lesions could be counted upon the fingers of one hand. It is astonishing to see so many of these cases break down between thirty and fifty.

Essential data.

In any case the examiner must make a careful report as to the exact condition of affected parts, and state whether there be present any glandular involvement or signs of inflammation, state the amount of deformity present and the extent of ankylosis, and in every case determine and report the temperature under the tongue at an afternoon hour.

Shortness of Breath.—Any habitual shortness of breath, whether due to emphysema, to heart disease, Bright's disease, asthma, or simply unexplained, is a sufficient cause for postponement, special rating, or rejection. (See Asthma and Dyspnea.)

Sores (Open Ulcers).—Nearly all open sores call for postponement, and their exact location, cause, and symptoms must be accurately stated. The term is a general one, and is intended to remind the applicant of an occurrence that a specific inquiry might not elicit. Suppurating glands, bubo, chancre, chancroid, necrosis, varicose ulcer, and many less important conditions may thus be brought to light.

* "The Comparative Vitality of Men and Women," "American Jour. of the Med. Sciences," March, 1894.

Stricture.—This and any other active evidence of a present or past gonorrheal infection is a bar to insurance at ordinary rates until completely cured.

Heat exhaustion, sunstroke, and apoplexy.

Sunstroke.—If a simple attack of heat exhaustion be fully recovered from, and if the applicant have for several years been entirely free from all suggestive symptoms during the hot weather, it need not be considered as a serious impairment. True sunstroke is usually considered as a cause for rejection or special rating even if remote. In elderly men particularly it is often really an apoplectic stroke. Careful inquiry is always necessary to determine the exact nature of the attack.

Surgical Operations.—(See Injuries.)

Swelling of the Feet and Face.—(See Dropsy.)

Often misnamed.

Syphilis.—First of all, the examiner should satisfy himself that the applicant's report of syphilis is correct. A person may, and often does, believe himself to have had syphilis when nothing more serious than chancroid was present.

Quacks' harvest.

Quacks frequently, yes, generally, call unimportant sores, like herpes præputialis, syphilis, and unskilled physicians frequently misinterpret chancroid. The sin committed in acquiring the one is no greater than in the other, but from an insurance standpoint there is a vast difference. One should seek, therefore, to determine the period of incubation, the location and number of sores, and the question of enlargement, inflammation, or suppuration of the inguinal glands as opposed to the ordinary indolent, nonsuppurative, bullet bubo of syphilis. Inquiry should also be made as to the occurrence of secondary manifestations, such as fever, rash, and sore throat. The treatment may have been instituted so early as to render the nonoccurrence of secondaries of no value as evidence. The epitrochlear and suboccipital glands should, of course, be examined. Syphilis being well attested, the examiner must ascertain what treatment was used, and for how long a period, and whether or not any symptoms have occurred since treatment ceased. He should remember that the mere fact that the initial lesion was multiple or herpetic does not exclude syphilis. Also that syphilitic scarring of the skin is bilateral, follows, as a rule, a pretty definite linear arrangement, and may be represented only by a loss of pigment at the points affected, providing ulceration has not occurred. Most companies will insure

Differentiation and essential data.

syphilitics at ordinary rates if treatment has been efficient and a period of not less than five years has elapsed since the disappearance of all symptoms. The author firmly believes this to be an error, and would, under no circumstances, advise that a straight-life policy be issued to any man who has a syphilitic history. Rating.

Endowment insurance might be safely granted in many of these cases, but to consider a syphilitic as having an equal chance with selected risks of reaching old age is to disregard the tremendous influence exercised by this disease in the incidence of other diseases and its treacherous nature, as evidenced by the extraordinarily frequent and diverse outbreaks so familiar to every practising physician.

Temperature.—"*What is the temperature under the tongue?*" This question is not often found in insurance blanks, but is of the utmost importance. On many occasions a slight rise in temperature detected by the examiner has saved the insuring company an early loss. He should never fail to take the temperature if required, and even if it be not mentioned in the blank, he would be wise to determine the temperature in every case in which the pulse is accelerated or the appearance of the applicant unfavorable. Very important.

The author recalls an example, one of many, of its extreme value as indicating incipient tuberculosis. A very reliable examiner took offense at what he thought was overcaution upon the part of the medical director of the insuring company, who objected to a temperature of 99.5° F., which the examiner contended was due to the heat of the summer and within the physiologic limits. It was redetermined twice with about the same result. The medical director was obdurate, and the applicant was postponed. About six months later the examiner frankly reported himself in error, and stated that the postponed applicant was in Colorado seeking a cure for a rapidly advancing phthisis. Illustrative case.

The physiologists give a wide range within the limits of health, one, indeed, that is not justified by daily experience in hospital wards. From personal experience, the author would advise that the examiner consider any temperature above 99° F. as suspicious and as affording good ground for redetermination. In such cases he should, when taking it the second time, choose an hour late in the afternoon. Not only is a slight rise in tem- The physiologic limit.

perature valuable as indicating a tuberculosis unrecognizable by physical signs, but also as suggesting the presence of some incipient acute process, such as influenza or typhoid. (See also Temperature in Tuberculosis.)

What constitutes excess.

Tobacco, Use of.—"*Do you use tobacco? If so, to what extent?*" It is difficult to draw the line closely in this particular matter, but it is very evident, even to a layman, that the excessive use of tobacco is productive of disease. The most injurious form is undoubtedly the excessive smoking of cigarettes, providing that, as is usually the case, the smoke be inhaled. In elderly men the *overuse* of tobacco is a positive danger by reason of its toxic effect upon the heart-muscle.

The real difficulty is found when one attempts to define excess, for it is really dependent in a large measure upon the individual. Gouty persons seldom bear tobacco well. The matter is one that must be left to the medical director, and the examiner is supposed to report any apparent evidence of overuse, such as a persistently dilated pupil, inflamed throat, nervous tremor, irritable heart, or other similar symptoms.

Symptoms of overuse.

Tremors and Convulsive Seizures.—"Fits," "convulsions," "spasms," "cramps," these various terms are used by the laity to cover everything from a simple tremor to intention tremor, paralysis agitans, chorea, hysteria, hystero-epilepsy, true epilepsy and catalepsy, brain-tumor or other forms of direct cerebral irritation, various nervous disturbances of dentition, worms, etc.

Significance of tremor.

The medical examiner must very carefully examine an applicant in whom a tremor is apparent, for any one who is so nervous as to get up a special tremor during a life insurance examination is not, ordinarily, a healthy subject. Tremors that men "are born with" are always open to doubt. The simplest form is the *senile tremor*.

Intention tremor is, if marked, almost pathognomonic of disseminated sclerosis. A person having this disease will not be able to perform any motion requiring coordination without producing a more or less well-marked tremor. A glass of water is spilled in being carried to the lips, the hands "fiddle" aimlessly about a refractory collar-button, or the tremor may be most marked when the afflicted person attempts to sign his name.

"*Chorea*," "*St. Vitus' Dance*," "*Convulsive Tic*."—The examiner is not likely to meet with a case in an applicant, as the disease is rare in the adult. Any history of chorea in the adult or in the youth or maid is of importance even if quite remote, and certainly calls for special rating. Cases in the child, if of moderate severity and short duration, ought not to affect insurability in later years. The heart must be most carefully examined in all cases presenting such a history, for associated valvular murmurs are extremely common. So also one should carefully investigate the family history, which is very likely to be tainted.

Condition of heart important.

Alcoholic tremor is important, and in at least one case in the author's experience led of itself to an investigation which proved that a man of supposed integrity and strict moral and religious views was accustomed to indulge in what has been quaintly denominated a "still jag." In other words, he was a "sneak" drinker, a man who would go to bed with a quart bottle, drink it, and sleep off the effect. The tremor in such cases is a very fine, rapid movement, such as is seen in cases of delirium tremens.

The "still jag."

The Tremor of Exophthalmic Goiter.—This is a fine, rapid tremor, very like the alcoholic, and the associated exophthalmos, goiter, and rapid pulse usually make the diagnosis clear.

Paralysis Agitans.—This disease is, of course, easily recognizable when fully developed, but not in its early stages. The early symptoms are: (*a*) A general stiffness or awkwardness of movement. The body in turning being moved as if it were one rigid piece. (*b*) A peculiar fixity of expression. As Beevor says, if one covered the lower portion of the face up to the nose, the remainder of the face would be quite fixed and unexpressive. From its appearance alone you would not know that the patient was speaking. (*c*) Tremor, if present in the early stage, is usually seen in one hand, a common movement being the rolling of the thumb over the forefinger. It is a disease of long duration, but if recognized, would debar the applicant from any but short-term insurance or special rating. The duration is from twelve to twenty-five years. (See also Rôle of Inspection.)

Duration.

Hysteric Tremor.—This, if general, can hardly be distinguished from other forms. It may be either slight and fine, or coarse and violent. The stigmata of hysteria must be sought.

Hystero-epilepsy.—The attacks of this hysteric manifestation

are easily recognizable if seen, but the examiner is chiefly interested in an applicant's account of them. The fact that no serious injury has been experienced by reason of the fall, that the lips and fingers may have been bitten but not the tongue, that the bystanders were unable to restrain the movements, and that urine is not passed involuntarily during the spasm but passed in quantity after it, would help to differentiate it from true epilepsy.

The scarred tongue.

True Epilepsy (*Grand Mal*).—One may find evidence of such an attack in a scarred tongue ; and all such scars, pointing, as they generally do, to epilepsy or syphilis, must be fully explained. The history of repeated falls with injury to the patient, a period of complete unconsciousness, involuntary micturition, and clonic spasm is sufficient evidence.

Petit Mal and Masked Epilepsy.—This form is not likely to be well described to an examiner. It will be remembered that in some cases there is simply a sudden and very short interval of unconsciousness, momentary perhaps, the subject merely pausing in the middle of a sentence and looking blank and strange, then going on as before ; or, in other cases, after complaining of giddiness and oppression, he becomes unconscious, remaining perhaps upright with fixed and straining eyes, and emitting a moaning sound. Urine may or may not be passed. Such cases are apt to be regarded and reported as faints.

Masked epilepsy is a term which covers those remarkable exhibitions of automatism which consist in partially or wholly undressing in public, in taking long journeys, or in committing crimes against the person, etc., without any subsequent recollection of the occurrence.

Catalepsy hardly needs an extended description.

Brain-tumor would be accompanied by other signs that simplify the diagnosis. Among the prominent symptoms are headache, vomiting, optic neuritis, and unilateral convulsive seizures, always commencing in the same muscle group. It is of but slight interest to the examiner for life insurance.

Cerebral Hemorrhage.—Lacking a history of paralysis or the presence of arteriosclerosis or cardiac disease, one can hardly distinguish with certainty those curious attacks of transient unconsciousness due to cerebral hemorrhage or to the lodgment of a minute cerebral embolism. Such attacks are frequently called

Minor attacks important.

bilious attacks or fainting fits, there being in most instances sudden unconsciousness or mental confusion, followed by nausea and vomiting, and, perhaps, diarrhea. Not infrequently, the patient drops as if felled by a blow on the head, yet in a few days or even minutes is quite himself again. "Fainting fits."

Uremic convulsions offer no very distinctive signs, and their occurrence must be inferred from the condition of the urine, from a direct history of coincident kidney disease, or from a failing vision found to depend upon retinal changes.

Muscular cramps, particularly of the calf, are common in alcoholism, Bright's disease, diabetes, and lead-poisoning. They may follow simple overexertion in a healthy person.

Truss, Wearing of.—(See Rupture.)

Tumor.—Any existing tumor, unless a simple sebaceous cyst or a small fatty tumor, rejects or postpones during continuance. Any history of a malignant growth, even though it may have been successfully removed by operation, is a bar to insurance at ordinary rates.

Ulcers.—(See Sores.)

Underweights and Overweights.—(See Measurements.)

Uremic Convulsions.—(See Tremor and Convulsive Seizures.)

Vaccination.—"*Have you been vaccinated?*"

"*Do you find scars attesting a successful vaccination?*"

If the answer is "yes," it is well to give the number of scars and their location, as they serve as additional means of identification. Many insurance companies will not insure an unvaccinated person unless he signs a clause releasing the company from all liability in event of his death from smallpox. If the applicant has had smallpox, the risk is improved by reason of the immunity conferred by the attack. Smallpox release clause.

Weight and Height.—"*What is the applicant's weight?*"

"*What is the applicant's height?*"

"*Has his weight recently increased or diminished? If so, to what extent?*"

Importance of Such Questions.—All of these are important questions not only as affecting acceptance and rejection, but because of their importance in identification.

Roughly speaking, a man five feet eight inches in height The normal.

should weigh from 150 to 162 pounds, according to age; and for each inch above or below this height five pounds should be added or subtracted. (See Tables.)

Allowable variation.

In practice it is assumed that a certain amount of variation in weight may be disregarded in rating a risk. This allowable variation is greater upon the side of overweight than of underweight. If the applicant's family and personal health record be above suspicion, 20 per cent. more or less than the average weight is allowed by every company. Some have, in the past, allowed 25 per cent. underweight; and one or two, 45 to 50 per cent. overweight, under the same restrictions. It is difficult to decide what the proper figures should be, and any rule must be subject to an occasional exception, but at present the tendency is in the direction of greater conservatism.

Vital points.

If the underweight have a well-developed and freely expanding chest, if his health record be good, his family members long lived and free from tuberculosis, and particularly if light weight is a family trait,* he may be accepted at ordinary rates even if he run 20 per cent. below the tabular weight. If, on the other hand, these favorable features be lacking, he can not be given so much latitude.

Overweight is a very difficult matter to deal with, and insurance companies differ widely in their views as to the safe limit.

Racial differences.

The Tennessee mountaineer is tall, thin, and wiry, but very healthy and long lived. A Pennsylvania Dutchman is remarkably heavy for his height, but is, nevertheless, also long lived. Such men can not be held to the same weight limits as would apply to men of a different race and build. A very powerful, muscular man who is a trifle out of condition may be considerably overweight and yet be an excellent risk. The really dangerous applicants are the flabby, big bellied individuals who lead sedentary lives, sleep and eat heavily, and have, in consequence, a decided tendency to apoplexy and diseases of the heart and kidneys.

Flabby overweight.

* The author saw an application not long since in which it was stated that the applicant's underweight was unimportant because it was a family trait; a reference to the family history showed that the mother, a brother, and one sister had died of consumption, a fact which gave the so-called family trait a somewhat different meaning than was intended.

If in such a case the family history show a tendency to such diseases, the hazard is greatly increased.

Generally speaking, it may be said that if a man be thick-set, hard, muscular and big boned, his personal and family history above suspicion, his habits temperate and his digestion good, his waist measurement less than that of his chest, he may safely be allowed a margin of from 25 to 30 per cent. above the tabular weight. Anything more should call for special rating or endowment policies. Some companies allow 45 to 50 per cent., others rarely more than 30 per cent., while one company is said to accept no one who weighs over 225 pounds.

Customary allowances.

The applicant should be weighed and measured. In all cases of extreme overweight or underweight the examiner should personally weigh the applicant, and *in every case examined he should take the exact height*, deducting the height of the boot heels.

A man will often unintentionally give his height an inch or two more or less than the proper figures, and if he be spare or stout, may intentionally add or subtract a number of pounds.

Recent loss or gain.

It is especially important that the question of *recent loss or gain in weight* be carefully investigated. If a loss has occurred, the company desires to know whether it is because of a failure in health or whether active outdoor life or what not may account for it. If the loss of weight be due to acute illness, the company will probably be inclined to postpone the risk until the former weight is regained. The same care is necessary in connection with unduly rapid increase.

The physician should remember that very heavy and very light applicants are not, as a rule, likely to prove good risks, and also bear in mind for his own protection that an exceedingly careful examination is demanded in such cases.

Office scales.

In weighing an applicant it is customary to have his house-coat removed. Platform scales are a very useful adjunct to any physician's office, and a little time spent in the careful weighing of light and heavy weights will not be wasted.

It may be mentioned in passing that very tall men are not generally liked by insurance companies. Giants are short lived, and very tall men are apt to be slender, stooped, with narrow chests and poor vitality. So also athletes, particularly profes-

Giants and athletes.

sional athletes, make indifferent risks. Sandow probably represents the highest attainable degree of physical development, but it is not likely that he could secure insurance save on a very expensive plan. In such men the enormous demands of the huge muscles seem to sap the vitality, and one is impressed by the large percentage of boxers, wrestlers, and oarsmen that succumb to disease early in life. Amateur athletes generally stop in time to prevent serious damage, but too many of this class also fail to live out their expectancy.

Recent Statistical Investigations.—The investigation of the Association of Life Insurance Medical Directors, through a special committee, consisting of Dr. Geo. R. Shepherd, of the Connecticut Mutual, and Dr. Brannan, of the Washington Life, has resulted in placing before the profession material of great value bearing upon the insurance of these overweight and underweight lives. In 1897 an elaborate table was presented showing the results obtained from an analysis of the examination of 74,162 selected male risks and 3016 female risks, the figures given being supposed to represent the actual weight of the individuals examined and to show the differences due to age.

The table may be compactly shown as suggested by Mr. Wells:

FOR AGE FORTY-SEVEN AND UPWARD.

Height.	Normal Weight.	− 20 Per Cent.	+ 20 Per Cent.	+ 30 Per Cent.
5 feet,	134 pounds.	107 pounds.	161 pounds.	174 pounds.
5 " 1 inch,	136 "	109 "	163 "	177 "
5 " 2 inches,	138 "	110 "	166 "	179 "
5 " 3 "	141 "	113 "	169 "	183 "
5 " 4 "	144 "	115 "	173 "	187 "
5 " 5 "	148 "	118 "	178 "	192 "
5 " 6 "	152 "	122 "	182 "	198 "
5 " 7 "	157 "	126 "	188 "	204 "
5 " 8 "	162 "	130 "	194 "	211 "
5 " 9 "	167 "	134 "	200 "	217 "
5 " 10 "	172 "	138 "	206 "	224 "
5 " 11 "	178 "	142 "	214 "	231 "
6 "	183 "	146 "	220 "	238 "
6 " 1 inch,	188 "	150 "	226 "	244 "
6 " 2 inches,	194 "	155 "	233 "	252 "
6 " 3 "	200 "	160 "	240 "	260 "

For younger ages, subtract ½ pound for each year under forty-seven, and the result will be the normal weight for the given age.

Rogers' Nylic Table.—From the figures of the committee Dr. O. H. Rogers has constructed the Nylic Standard Table of Heights and Weights, which shows at a glance the normal weight at any age or height for either sex, and the exact percentage of underweight and overweight exceeding 25 per cent. for the former and 20 per cent. for the latter. This table is invaluable to the medical director or examiner, and is very simple if once understood. Dr. Rogers thus describes it:

"This standard table is based upon the recorded heights and weights of 74,176 male and 3016 female applicants accepted for insurance in various American companies. The data were accumulated by a committee of the Association of Life Insurance Medical Directors, from the medical examiners' reports placed at the disposal of the Association by the companies. It is impossible to say how large a proportion of these cases were actually weighed and measured; the instructions of the various companies to their examiners being to weigh and measure them whenever possible. The results here given represent, therefore, not the *actual* facts, but the facts *as reported.* They agree substantially with those obtained from a study of 5250 cases actually weighed and measured in the office of the New York Life Insurance Company.

"The object of this graphic table is to give at a glance not only the weight for any height at any age, but also to give the percentage over- or underweight of any given case where that case is much above or below the standard build. The table is made up of two portions: (1) That in which are recorded the normal weights for the various heights and ages. (2) That which gives the percentage over- or underweight of any given case.

"For greater convenience, the latter portion of the table is arranged to read only for 20 per cent. and more underweight, and 25 per cent. and more overweight. The short vertical lines marked 5′6″, 5′7″, 5′8″, and so on, are the height lines. The diagonal curved lines, marked 20, 30, 40, and 55, are the age lines for men; the lines designated by the sign ♀ are the age lines for women. The intermediate ages fall at proportionate distances between these curved lines. The intersections of the age lines with the vertical height lines fix the normal weight

THE NYLIC STANDARD TABLE OF HEIGHTS AND WEIGHTS.

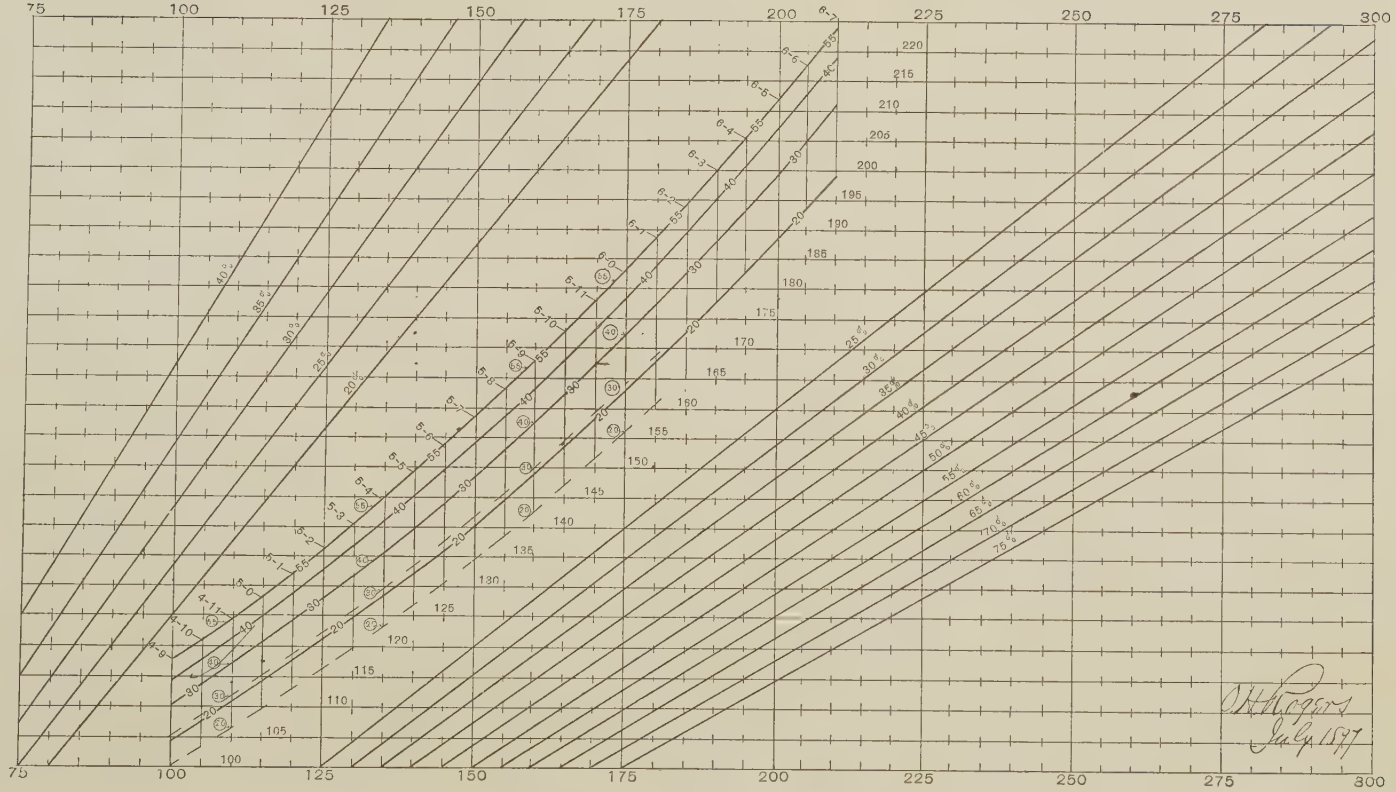


FIG. 8.—THE NYLIC STANDARD TABLE OF HEIGHTS AND WEIGHTS.

points. The weights at intervals of 5 pounds are recorded on the horizontal lines to the right of the diagonal curved lines.

"Thus, a man 5′6″ in height should weigh, at age twenty, 135½ pounds; at age thirty, 143½ pounds; at age forty, 149½ pounds; at age fifty-five, 153½ pounds. The weights for intermediate ages are found at corresponding intermediate points.

"A woman 5′6″ in height should weigh, at age twenty, 130½ pounds; at age thirty, 137¼ pounds; at age forty, 143½ pounds (the same as a man at age thirty). At fifty-five the weights of men and women are the same. In this way are found the normal weights for any height at any age.

"Now, let us suppose that a man 5′6″ in height and twenty years of age weighs 225 pounds; how much is he overweight? His normal weight is 135½ pounds. Passing from the normal weight-point horizontally to the right until we reach the vertical line marked 225, we find ourselves just outside the 65 per cent. line; such a person is thus found to be 66 per cent. overweight. Again, supposing the weight to be 100 pounds, we pass horizontally to the left to the 100 pounds vertical line; the intersection of our weight line with this vertical line shows him to be 26 per cent. underweight. In the same way the percentage of any given weight above or below the normal may be obtained.

"The vertical weight lines are 25 pounds apart, but for greater accuracy the intervening spaces are divided by broken lines into 5-pound subdivisions.

"Mistakes in the use of the chart will be avoided if the following steps are taken in their proper order: Exact procedure.

"1. *Fix upon the height-line.*

"2. *Locate the age-point on that line. The point thus found gives the normal weight for the height and age.*

"*If the case is very much over- or underweight*—3. *Pass horizontally to the right in case of overweight, and to the left in case of underweight, to the intersection with the vertical weight-line. The position of the point thus found fixes the per cent. over- or underweight.*"

The following interesting figures were given by Dr. Shepherd * as illustrating the effect of build upon longevity :

Tables illustrating effect of weight upon longevity.

Class.	Exposed.	Living.	Dead.	Living.	Dead.
Normal weights, . .	1277	1092	185	85.5 per cent.	14.5 per cent.
Twenty per cent. or more underweight,	23	18	5	78.3 "	21.7 "
Twenty per cent. or more overweight, .	86	60	26	69.8 "	30.2 "

"Thus it appears that there is something in the make-up of these abnormal weights which reduces their stamina and renders them more susceptible to disease and death. It will be instructive to glance at our mortality records and see what are the diseases of which these men die :

Table Showing Percentage of Deaths Among 26,222 Dying from All Causes, Classed as Overweights and Underweights—*i. e.*, Twenty Per Cent. Variation from Normal. Experience of Connecticut Mutual Life Insurance Company, 1846 to 1895, Inclusive.

Special diseases.

Class.	Underweight.	Overweight.
Tuberculosis, ...	22 per cent.	1.9 per cent.
Rheumatism and gout, ...	1.1 "	2.2 "
Diabetes, ...	0 "	3.5 "
Nervous diseases, ...	14 "	23 "
Heart disease, ...	6 "	15.5 "
All circulatory diseases, ...	7.8 "	17.9 "
Pneumonia, ...	12 "	6.5 "
All respiratory diseases, ...	16.4 "	9 "
Digestive diseases, ...	7.5 "	8.5 "
Kidney diseases, ...	5.2 "	9.7 "

"Thus it will be observed that more than half of the underweights died of tuberculosis, respiratory and nervous diseases ; while a marked majority of overweights died of nervous, circulatory, kidney, and respiratory diseases. Twenty-eight per cent. of all our deaths from diabetes were found among the overweights, and not one death among the light-weights."

He very properly laid stress upon the necessity for further consideration of this subject, and stated his belief that light-weights and heavy-weights are poor risks for the following reasons :

* In an interesting paper entitled "The Relation of Build to Longevity." "Medical Examiner," July, 1899.

"Light-weights may be said to be poor risks for the following reasons:

Reasons for increased mortality.

"1. They are abnormal and die short of their expectation.

"2. They are prone to develop tuberculosis and nervous diseases.

"3. They are frequently underfed and overworked, suffering from malassimilation.

"4. They are usually *of a very nervous temperament, and so wear out quicker than men of ordinary build.*

"The overweights are poor risks because:

"1. They are abnormal.

"2. They are prone to develop heart disease, apoplexy, and premature arteriosclerosis.

"3. They are peculiarly liable to diabetes, rheumatism, and lithemia.

"4. They take insufficient exercise and eat heartily, as a rule, and frequently are intemperate in the use of stimulants, particularly of malt liquors.

"5. They succumb easily to accidents and surgical operations."

In the interesting discussion which followed the reading of this paper Dr. O. H. Rogers said: "With reference to the influence of overweight on longevity, I should like to say a few words. I have listened with the deepest interest to the remarks made by Dr. Shepherd and Dr. Fisher, and have been impressed with the close agreement between the conclusions they have arrived at, and the results of certain researches of my own on that subject. Their testimony and mine, taken from three different sources and by very different methods, unite in showing a mortality *about forty per cent. greater among these heavy-weights than among selected lives.* Each one of these companies has been endeavoring to pick out only the best of the overweights, and each one has met with just about the same success. It may be that some day we shall know how to distinguish between heavy-weights that are good average lives and those in which the mortality will be high; at present there is no evidence before us to show that we now know how to do so, and a great deal to show that we do not.

Startling figures.

"I think that there is only one conclusion to be drawn from the facts, and that is *that any company that accepts risks on lives*

twenty-five per cent. or more overweight is going to have a high mortality among those lives. From observations of my own I am able to say with the utmost confidence that high mortality will occur whether they are insured on life tables or on endowment tables, and in spite of the care shown in their selection."

It would thus appear that at the present time this class of lives is regarded with more dread than ever before, and that in the case of heavy-weights particularly, future ratings will be less liberal than those of the past.

Waist Measurements.—(See Measurements.)

Women, Insurance of.—(See Sex.)

TABLE I.

DIAGRAM ILLUSTRATING THE INFLUENCE OF *Family History* IN MODIFYING THE PROPORTION OF CONSUMPTIVE DEATHS IN THE TOTAL MORTALITY.

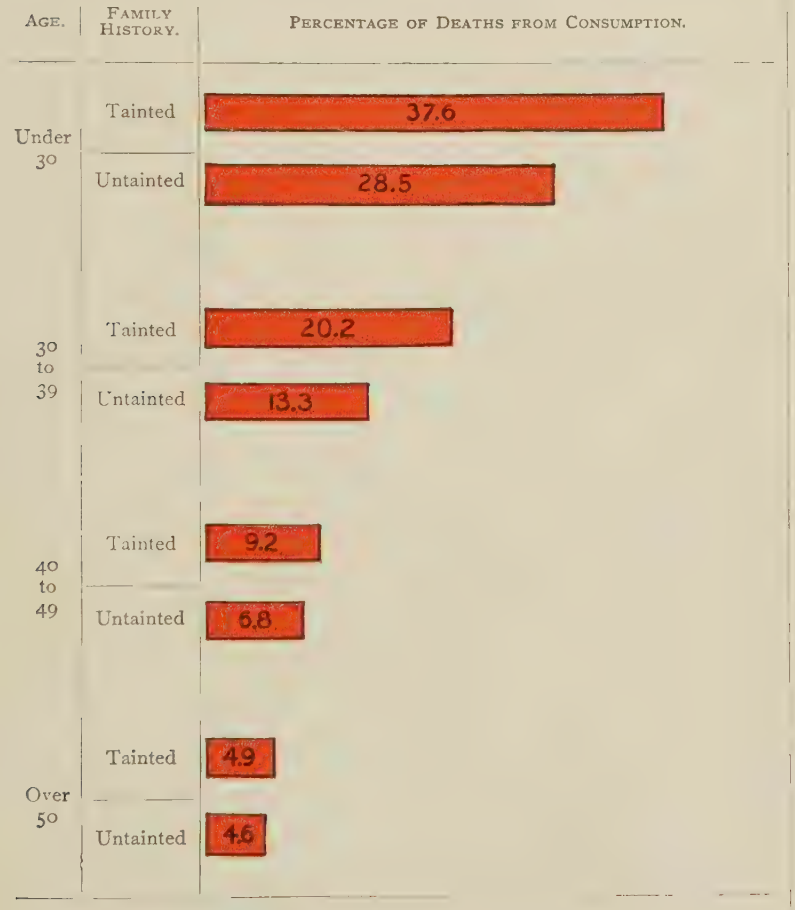


TABLE II.

DIAGRAM ILLUSTRATING THE EFFECT OF PERSONAL *Weight* IN MODIFYING THE PROPORTION OF CONSUMPTIVE DEATHS IN THE TOTAL MORTALITY.

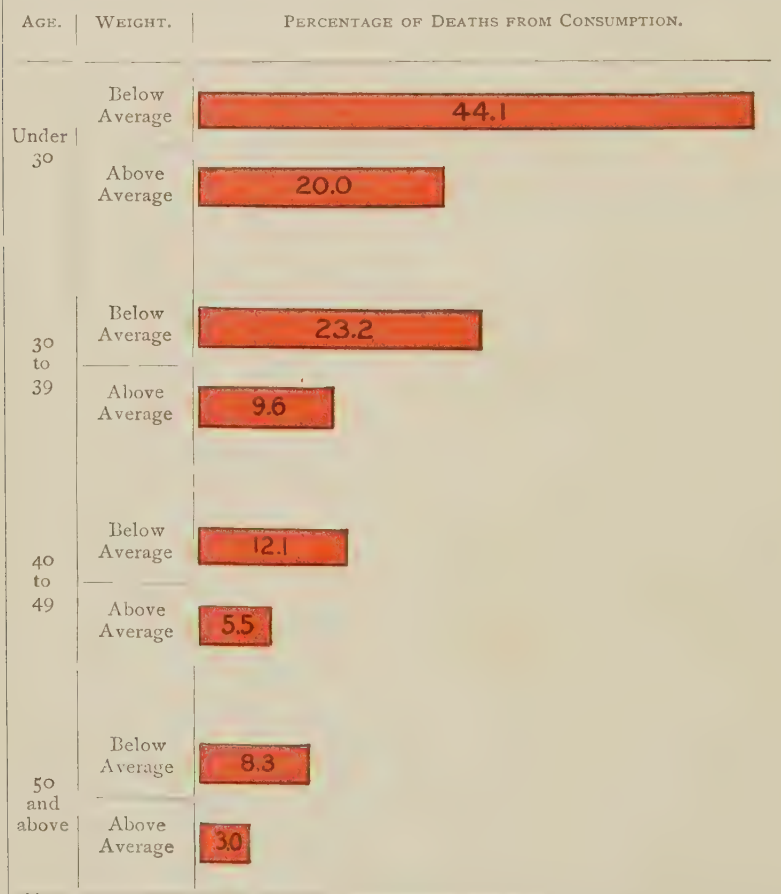


TABLE III.

DIAGRAM ILLUSTRATING THE INFLUENCE OF *Overweight* AND *Family Record* COMBINED IN MODIFYING THE PROPORTION OF CONSUMPTIVE DEATHS IN THE TOTAL MORTALITY.

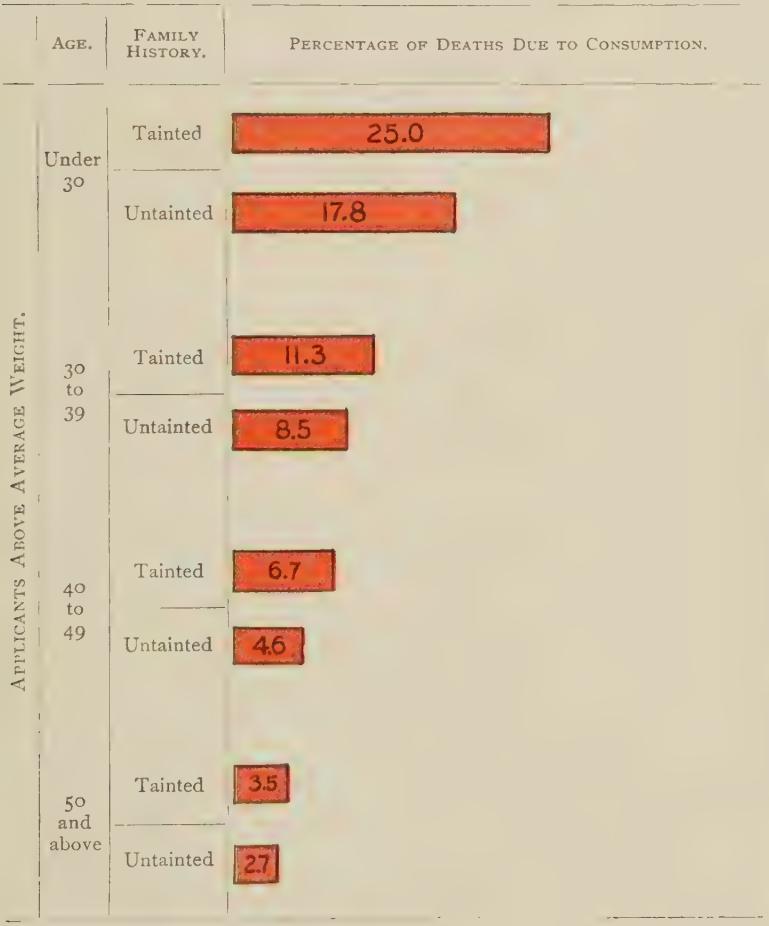
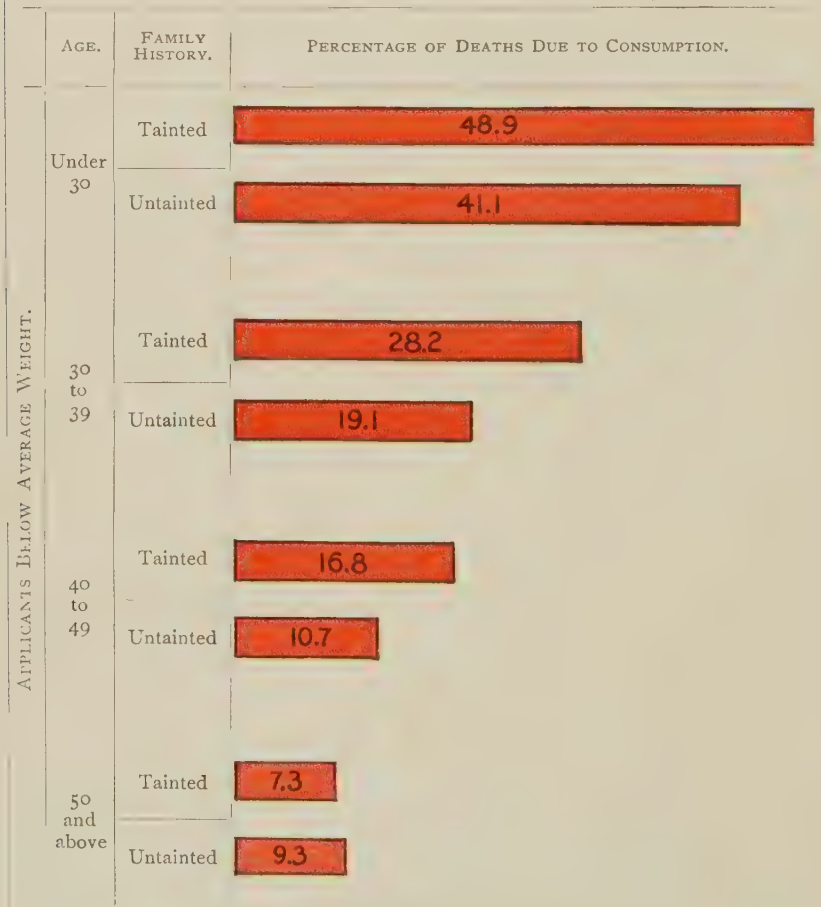


TABLE IV.

DIAGRAM ILLUSTRATING THE INFLUENCE OF *Family Record* AND *Underweight* COMBINED IN MODIFYING THE PROPORTION OF CONSUMPTIVE DEATHS IN THE TOTAL MORTALITY.



HEREDITY.

"THE FAMILY HISTORY."

"There is a destiny made for a man by his ancestors, and no one can elude, were he able to attempt it, the tyranny of his organization." *

Thus has Maudsley put that terrible law of inheritance, proclaimed in scripture and recognized by all men from time immemorial. The unfavorable influence of inherited taint upon longevity is recognized and respected by life insurance companies, and their medical examination blanks go into the question in a very searching and direct manner. The following form is usually adopted:

IN REPORTING FAMILY HISTORY STATE

AS FAR AS YOU KNOW, WHAT IS THE AGE AND PRESENT STATE OF HEALTH OF EACH OF THE PERSONS NOW LIVING. WHAT WAS THE AGE AT DEATH, CAUSE OF DEATH, OF EACH OF THEM, IF DECEASED? IN GIVING THE CAUSE OF DEATH, AVOID ALL INDEFINITE TERMS, SUCH AS "GENERAL DEBILITY," "CHANGE OF LIFE," "FEVER," "EXPOSURE," ETC. IF THE WORD CHILDBIRTH BE USED, HOW LONG AFTER DELIVERY DID DEATH OCCUR, AND WERE THERE ANY SYMPTOMS OF DISEASE OF THE CHEST, SUCH AS COUGH, EXPECTORATION, ETC. WHERE APPLICANT CAN NOT ANSWER FULLY, HE SHOULD EXPLAIN WHY HE DOES NOT KNOW.

50.	LIVING.		DEAD.			
	AGE?	HEALTH? Be explicit.	AGE?	SPECIFIC CAUSE OF DEATH?	HOW LONG SICK? Be careful to state explicitly *duration* of fatal illness in every case.	HEALTH PREVIOUS TO FATAL ILLNESS?
Father,						
Father's father,						
Father's mother,						
Mother,						
Mother's father,						
Mother's mother,						
How many brothers.						
How many sisters.						

Illustrative forms.

51. Have *you or any of your blood relations* ever attempted suicide, or suffered from insanity, gout, rheumatism, epilepsy, consumption, cancer, apoplexy, or other hereditary disease?

52. Have any members of your immediate family (wife or children) suffered from consumption?

53. Are you intimately associated with any person having chronic cough?

* Maudsley "Responsibility in Mental Disease."

It will be seen that inquiry is made concerning the parents, brothers, sisters, grandparents, and collaterals, and that the diseases covered are those in which the hereditary influence is unquestionable. Such are insanity, gout, heart disease, apoplexy (paralysis), epilepsy, rheumatism, hemophilia, cancer, and tuberculosis. Syphilis might be, but usually is not, added to this list.

Alternative conditions.

The question is one chiefly affecting hereditary predisposition to disease, and many of the conditions are alternative. Gout need not appear as gout in the second or third generation, but may manifest itself in any of those conditions in which gout is recognized as an etiologic factor. Such, for example, are apoplexy, Bright's disease, diseases of the heart and blood-vessels, or even a chronic eczema. The same statement holds true of nearly all hereditary diseases. Thus, insanity in the ancestors may in descendants appear as epilepsy, alcoholism, hysteria, chorea, or criminal impulse.

Syphilis.

Syphilis is so wide-spread as to be present in the great mass of humanity in varying degrees of dilution, and one writer has gone so far as to say that the higher our civilization, the more complete is our syphilization. Some striking examples of heredity appear in contemporary literature. Russell, in "A Plea for Posterity," refers to the Jurke family. Frau Jurke was a chronic drunkard, who was born in 1740 and died in the year 1800; 709 of her 834 descendants were traced, with the following result: One hundred and six were illegitimate; 142 were beggars; 64 were charges of the State; 181 females were prostitutes; 69 were convicted of crime; and, all told, the descendants of this one dissolute and drunken woman cost the State during a period of seventy-five years a sum estimated at $1,250,000.

Frau Jurke.

Alcoholism.

Le Grain says that of 814 children born of parents who were alcoholics, 322 were degenerates and 174 died young. Of the survivors 17 per cent. were epileptic and 14 per cent. suffered from hysteria. Aside from specific diseases there are two distinct classes of families—the "long lived" and the "short lived."

Long-lived Families.—In these there is in the individual a well-marked resistance to all forms of disease. Acute dis-

ease is well borne, chronic disease is long resisted, and even a physical blemish may leave such a one a better risk than an apparently healthy man of the "short-lived" family.

Short-lived Families.—In such families no hereditary disease is necessarily present, yet there is a general tendency to early death of its members. The conditions are exactly opposite to those that prevail in the long-lived families, both acute and chronic diseases being met with feeble resistance and speedily proving fatal. Members of long-lived families are the most profitable risks that any insurance company can assume, whereas the short-lived people are worse subjects for insurance than those whose family is tainted by hereditary disease. An extremely bad family history of tuberculosis might prove an exception to this rule, as in such a case there would be a similar tendency to early death in family members.

An "increasing hazard."

Heredity in Apoplexy.—Apoplexy is one of the most strikingly hereditary of all diseases, and inasmuch as its incidence depends upon degenerative processes in the blood-vessels, it at once becomes evident that with it must be considered such associated or alternative conditions as arteriosclerosis, chronic Bright's disease, particularly interstitial nephritis, aneurysm, and, to a less extent, heart disease. In this form of hereditary disease the tendency is for the family members to die in middle age, consequently, such a risk, if accepted, becomes an increasing hazard, such cases often being profitably insured under short endowments. The following history from the author's case-book may prove interesting in this connection. The patient presented himself in the terminal stage of an interstitial nephritis, of which he has since died:

Remarkable case history.

His maternal grandfather	died, aged	53,	of apoplexy
His mother	" "	40,	" "
His paternal grandmother	" "	55,	" "
His father	" "	45,	" "
His sister	" "	55,	" "
His brother	" "	43,	" heart disease
His "	" "	45,	" Bright's disease
Applicant	" "	46,	" " "

One surviving brother reported in "fair health" in 1893, cause of impairment not known, no other member of family living.

Another "increasing hazard."

Cancer.—The hereditary nature of cancer is a subject of dispute, but the weight of evidence is strongly in favor of a well-marked hereditary influence. Many of the statistics that have been adduced in support of the opposing argument have been founded upon life insurance records of family history, which are notoriously unreliable because of the almost universal tendency on the part of the applicant to conceal or modify disagreeable features. Few practising physicians could be found who would doubt the transmissibility of or inherited tendency to this disease. As in the case of apoplexy, so in cancer, the risk, if assumed, is an increasing hazard, as is well shown from the fact that of 161,920 deaths from cancer occurring in England and Wales in 1881–90, the maximum mortality occurred between the ages of forty-five and seventy-five—$\frac{19}{20}$ above thirty-five, $\frac{5}{6}$ above forty-five.

Broca's case.

Many interesting family histories might be noted in this connection. In Broca's well-known case—Madame Z——— died of cancer. Her four daughters died of cancer. One of these daughters had seven children. Five of these children died of cancer—one son and four daughters. Another daughter had five girls, all of whom died of cancer, and one of these girls had a daughter who died of this disease, thus carrying it to the fourth generation. It seems to be an established fact that the liability to inherited cancer is considerably greater on the female side.

Insanity.—The inheritance of insanity or of its alternative morbid states is so well attested as to require no extended statement. Here again the risk, if assumed, is an increasing hazard, and, as is well known, even actual insanity in the individual is often compatible with a reasonably long life.

Diabetes.—This disease is distinctly hereditary, though its associations in heredity are not very distinctly defined.

Rheumatism.—Rheumatism is markedly hereditary, is closely associated with heart disease in the family history, and is considered by many to bear a curious and interesting relation to tuberculosis.

Gout.—This is one of the most serious of hereditary diseases, by reason of its wide-spread influence in the production of its alternatives or consequents—apoplexy, Bright's disease, arterio-

sclerosis, and certain forms of diabetes. Here again we have to do with an increasing hazard.*

Hemophilia.—This affords one of the most interesting examples of atavistic transmission, and its seriousness makes one wonder that insurance companies should fail to include it in their question as to inherited diseases. Quite recently a case came under the author's notice in which nearly the whole of a promising family of boys had died from trivial injuries followed by uncontrollable hemorrhage. In this disease the inheritance is almost invariably through the females of a family to their male descendants. Cases have been reported in which this curious transmission has been present in one family for more than three hundred years. It is needless to say that the sons of such families are extrahazardous risks.

Atavistic transmission.

Tuberculosis.—The discovery of the bacillus tuberculosis and the inevitable conclusion that the disease is distinctly infectious has led many men to question or even deny the influence of heredity in its production.

In some instances this position has been assumed under the faulty premise that the doctrine of direct transmission is advanced by the believers in the hereditary tendency to this disease. That such transmission may occur is undeniable, but all admit that such instances are so rare as to have but little influence in the propagation of the disease. On the other hand, it is maintained that a predisposition to the development of this disease and a lack of resistance to the infection and infective agents are distinctly hereditary.

Direct transmission rare.

Statistics based upon insurance records can never be more than approximately correct, and even private case records are vitiated by the common tendency on the part of tainted families to either innocently or wilfully conceal the real facts.

Vitiating error.

Several years ago the author closely investigated the family histories of 100 cases of pulmonary tuberculosis seen in hospital and private practice, and found that 70 per cent. of that number came of tainted stock.

A belief in the influence of heredity need in no degree modify

*Dr. Vivian Poore has remarked that in a "few instances" the inheritance of gout has been the inheritance of a good income and a fine cellar.

or influence one's belief in the theory of infection. It must indeed be assumed that in practically all cases true infection has been established postpartum, for in most instances the children of tuberculous parents dwell in an atmosphere and amidst surroundings that render infection not only possible but well-nigh inevitable. If one child be infected, the danger to the remaining brothers or sisters is greatly increased, and it may reasonably be supposed that an hereditary predisposition is transmissible, and acts chiefly to invite infection and furnish a kindly soil for the growth of the specific germ. Another fact that can not be disregarded is the liability to excessive early mortality from other diseases in families tainted by tuberculosis. This is a matter of common experience.

Infection and heredity not incompatible.

The vital fact.

As regards life insurance, one cardinal fact is the mainspring of action; this is, that applicants who have lost near relatives by tuberculosis furnish an excessive mortality and are unprofitable risks, if taken at all ages and under all conditions, at ordinary rates. This has been demonstrated again and again by the statistics of life insurance companies, and quite recently Dr. E. J. Marsh, of the Mutual Life, has issued an interesting monograph bearing upon this point. His conclusions are based upon a careful investigation of 22,085 deaths, representing the entire mortality of his company (the Mutual Life, of New York) from 1879–1893 inclusive. It must be remembered that, as has been previously stated, all such figures furnish only an approximation to the truth, and that if it were possible to investigate the same number of family histories truthfully stated, the case against tuberculosis would be greatly strengthened. Furthermore, it must be remembered that only those cases believed to be safely insurable are considered at all, rejection being the rule if the taint is strongly marked.

Statistical data.

Of Dr. Marsh's cases, 1994 showed a family record of tuberculosis. His analysis of these cases is represented by the following table, which would seem to amply justify the doctor's conclusions. In order to meet the demands of the printer the graphic charts (pp. 131–134) have undergone a necessary rearrangement without, it is hoped, any sacrifice of either clearness or accuracy:

TABLE.*

SHOWING THE PROPORTIONATE MORTALITY FROM CONSUMPTION AND OTHER CAUSES AMONG THOSE WITH TAINTED RECORD, AND ARRANGED ACCORDING TO THE DEGREE OF TAINT AND THE AGE AT INSURANCE.

FAMILY RECORD OF CONSUMPTION. MEMBER OF FAMILY AFFECTED.		AGE AT INSURANCE.				
		Total.	20–29 years.	30–39 years.	40–49 years.	50 years upward.
No member affected, .	Deaths from all causes, .	2706	473	903	813	517
	" consumption,	333	135	120	54	24
	Percentage, ...	12.7	28.5	13.3	6.8	4.6
Both parents,	Deaths from all causes, .	7	...	1	2	4
	" consumption,	1	...	...	1	...
	Percentage, ...	14.3	...	...	50.0	...
Father, . .	Deaths from all causes, .	343	69	136	86	52
	" consumption,	66	30	22	9	5
	Percentage, ...	20.7	43.3	16.1	10.4	9.6
Mother, . .	Deaths from all causes, .	457	79	156	135	87
	" consumption,	71	29	28	10	4
	Percentage, ...	15.5	36.5	17.1	7.5	4.6
Parent and brother or sister, . .	Deaths from all causes, .	120	11	42	36	31
	" consumption,	13	2	9	2	...
	Percentage, ...	11.0	18.2	21.4	5.5	...
One brother or sister, .	Deaths from all causes, .	933	88	306	284	255
	" consumption,	133	30	63	29	11
	Percentage, ...	14.3	34.1	20.6	10.2	4.3
Two or more brothers or sisters, . .	Deaths from all causes, .	134	8	33	53	40
	" consumption,	26	5	14	4	3
	Percentage, ...	19.4	62.5	42.4	7.5	7.5
Two members affected, . . .	Deaths from all causes, .	261	19	76	91	75
	" consumption,	40	7	23	7	3
	Percentage, ...	15.3	36.8	30.3	7.7	4.0
One member affected, .	Deaths from all causes, .	1733	236	598	505	394
	" consumption,	270	89	113	48	20
	Percentage, ...	15.6	37.2	18.5	9.2	5.1
Parent and brother or sister, . .	Deaths from all causes, .	120	11	42	36	31
	" consumption,	13	2	9	2	...
	Percentage, ...	11.0	18.2	21.4	5.5	...
Two or more brothers or sisters, . .	Deaths from all causes, .	134	8	33	53	40
	" consumption,	26	5	14	4	3
	Percentage, ...	19.4	62.5	42.4	7.5	7.5
One parent, .	Deaths from all causes, .	800	148	292	221	139
	" consumption,	137	59	50	19	9
	Percentage, ...	17.1	39.8	17.1	8.6	6.5
One brother or sister, .	Deaths from all causes, .	933	88	306	284	255
	" consumption,	133	30	63	29	11
	Percentage, ...	14.3	34.1	20.6	10.2	4.3

* "Value of Family History and Personal Conditionin Estimating a Liability to Consumption," published by the Mutual Life Insurance Company, New York, 1895.

From these figures Dr. Marsh makes the following deductions :

Important deductions.

1. That the history of consumption in any one of the immediate family increases the probability of its appearance in the applicant.

2. That consumption in a brother or sister is at least equal in importance to parental phthisis.

3. That "underweights" are much more liable to the disease than are "overweights."

4. That robust and well developed individuals show comparatively little susceptibility to phthisis.

5. That the physique is of more importance than the family history, and that, consequently, a robust body may in some degree counterbalance a tainted family record. Another and most important point brought out by the doctor's tables is the fact that the influence of family history and the counter-effect of a good physique bear no relation to the age of the individual. (A study of the tables would lead one to infer that this statement holds good only of the ages from thirty upward.)

These conclusions, though borne out and fully justified by the figures submitted, can hardly be accepted without reservation as applying to general practice outside of the insurance field, for while it is true that a great many cases of consumption occur in poorly nourished underweight individuals, yet a very respectable proportion is to be found in that class whose members, though tainted by heredity, are described as having previously been "pictures of health." It is to be feared that far too many of those rated as sound "light-weights" in life insurance represent cases of incipient or arrested tubercular infection. For practical purposes the following matters must always be considered in the rating of an applicant whose family history is tainted with tuberculosis :

Insured "light-weights" frequently tuberculous.

Conditions that Affect the Rating.—(*a*) *The Age.*—Even though it be granted that after full maturity is attained the liability to tuberculosis is nearly the same in all succeeding years of life, it must, nevertheless, be admitted, and indeed is proven by the foregoing tables, that the mortality is relatively much greater in immature individuals. Usually thirty years may be taken as representing a reasonably safe limit. Occasionally, an evident

Greatest mortality in early life.

family tendency to the late development of the disease must be considered.

(*b*) *The Size of the Family.*—It is evident that the applicant's liability to inherited taint varies inversely as the ratio of healthy to infected family members.

(*c*) *The Degree of Relationship.*—On this point authorities are somewhat in conflict, some claiming that parental tuberculosis exercises a much greater effect than does that appearing in brothers or sisters, while others, like Dr. Marsh, believe the two elements to be about equal, and this latter view conforms to the experience of the general practitioner. Aside from the general proposition, many special problems suggest themselves in this connection, such, for example, as requires the determination of the relative importance of the death of both father and mother to several deaths among brothers and sisters. Many complicated questions are thus introduced.

(*d*) *Physical Resemblance to the Deceased Family Members.*—This is unquestionably a matter of considerable importance, and justifies the question commonly found in the examination blanks of American companies: "*Which of the parents does the applicant resemble?*"

(*e*) *The Physique of the Applicant.*—That hard muscles, a sound heart, freely expanding lungs, and good blood render their possessor to a certain extent immune to phthisis is of course beyond question, but that the physically sound member of a consumptive family is as safe a risk as the healthy man of untainted stock is more than doubtful.

(*f*) *Environment of the Individual.*—This question often presents points of the greatest interest. Dampness, foul air, lack of sunshine, all favor the development of tuberculosis, and predispose the individual to infection.

(*g*) *Was either parent suffering from tuberculosis when applicant was born or conceived?*—a question of great importance.

(*h*) *Exposure to Infection.*—Curiously enough, despite the well-known infectivity of tuberculosis, insurance companies have until quite recently failed to inquire as to the applicant's association with consumptives. As a result of this omission companies have insured thousands of men exposed daily in their own households to infection through their wives or children.

A strange omission.

Such might appear as excellent risks with a clean family history, and yet be far more dangerous to the company than others whose family history was such as to have caused their rejection. Thanks to the introduction of better and more efficient means for the early diagnosis of tuberculosis, and still more to the wide-spread knowledge of its transmissibility, both the general and insurance mortality from consumption have greatly diminished, and we may look hopefully forward to a time when this "great white plague" will be as rare as is leprosy at the present day.

The Inheritance of Syphilis.—The evil and wide-spread effects of syphilitic infection have already been mentioned, and, as regards life insurance, so many difficulties stand in the way of proper investigation of this factor as to practically remove it from consideration and oblige the companies to limit their inquiries to syphilis existing in the individual.

Seldom traced in life insurance work.

The Unreliability of the Reports upon Family History Commonly Seen upon Insurance Examination Blanks.—That the statements concerning family history must, in a measure, be indefinite or incorrect is to be taken for granted in securing any case history. The reason for this condition is to be found either in an ignorance of the actual conditions causing the death of family members or in the wilful misrepresentation or suppression of the true facts. In ordinary practice ignorance and perhaps a certain amount of family pride are the influences chiefly operating. In life insurance work there is the added element of falsification. These impediments to a proper consideration of an application for insurance are heightened by the frequent failure of medical examiners to appreciate the importance of definite and reasonable statements, and a full compliance with the instructions contained upon the application blank of every insurance company. Certain frequently used terms are the bane of medical directors and a fertile source of entirely unnecessary correspondence. One of these terms is "childbirth." If one were to judge the mortality of childbirth by the number of cases reported in applications for insurance, he would believe it to be more deadly than the plague. It is a significant fact that those applicants whose mothers are said to have died of childbirth show an astonishing mortality from tuberculosis; one, in fact, that runs curiously paral-

Ignorance or deceit.

"Childbirth."

lel to the increased mortality observed among those whose mothers have died of tuberculosis.

H. W. Manly investigated this question and found that out of 226 persons whose mothers died in childbirth, the mortality was 28 per cent. above the expected loss; and, furthermore, that the percentage of deaths from tuberculosis was slightly in excess of that present in cases showing a history of maternal consumption.* All of this proves simply that the cause of death was not truthfully stated, though it must be admitted that very frequently the applicants are uninformed as to the exact conditions present. It becomes the examiner's duty in this and in similar cases to inquire *first* as to the length of illness; *second*, the previous health; and, *third*, as to the symptoms present during the illness under consideration.

The examiner's plain duty.

"Old age" is a term most woefully abused in life insurance applications, occupying a place in the medical director's "index expurgatorius" second only to "don't know." It must be remembered that a person can hardly be said to die properly of senile decay short of three score and ten, and when, as is often the case, important family members are reported as dying of old age in the fifties, the effect upon the application is exactly as if they had been stricken with apoplexy. "Don't know" is sometimes a wholly justifiable expression; more often it represents in the mind of the medical director a disposition to shirk the truth, and thus unfavorably affects the applicant's chances of acceptance. Hence, if used in connection with the death of near relatives an explanation should always be appended. A great many terms are regarded at the home office as synonymous with tuberculosis and cancer. Medical examiners should know what these are, in order that when, as is sometimes the case, they are properly used, a little foot-note may be inserted, testifying to their correctness, such are "fistula," "malaria," "chills and fever," "decline," "marasmus," "broken heart," "grief," "fever," "chronic bronchitis." In the case of almost all of these there is a lack of definiteness that strongly suggests the need of further investigation.

"Of old age" at 50.

"Don't know."

Terms synonymous with cancer and tuberculosis.

Health of Surviving Family Members. — A somewhat

* "Journal of the Institute of Actuaries," vol. xxx, p. 97.

"Fair." "Poor." "Not strong."

common error in connection with family history occurs in the description of some surviving relative's health as "fair" or "poor" or, again, "not strong." In all such cases further information is absolutely necessary. *In conclusion, one may sum up the requirements of the medical department by saying that it wants direct, concise, and specific information as to the nature of any illness present in a living person or believed to be the cause of a death. It further desires to know the duration of the last illness and the state of health previous to that illness.* One of the most easily recognized of the signs that mark the competent examiner is a careful and accurate report upon the family history of his applicants.

OCCUPATION AS AFFECTING LONGEVITY AND THE INCIDENCE OF DISEASE.

To properly consider "occupation" in its relation to longevity and the incidence of disease, would require a good-sized volume, and one can attempt only a brief summary of some of its salient points.

The question must necessarily be considered in the several quite distinct aspects presented by different callings.

1. *The moral hazard introduced.*
2. *The question of excessive mental strain.*
3. *The general sanitary conditions present, including exposure to heat, cold, and general unhygienic conditions.*
4. *Special conditions leading to the introduction of various organic or inorganic poisons into the body.*
5. *The influence of prolonged and unusually severe muscle-strain, of cramped positions, or of repeated and excessive activity of certain definite "neuromuscular units."*
6. *Liability to accident.*
7. *Stigmata of occupation.*

Such a classification is necessarily imperfect, and any strict adherence to its terms is manifestly impossible, by reason of the fact that certain occupations will fall within several of its divisions. For this reason no attempt will be made to adhere rigidly to its provisions, though as far as is possible the general plan of arrangement will be followed.

All insurance companies consider in their rating of a risk the occupation of the applicant. Indeed, the immense increase in manufacturing during the present century, and the resultant impetus given to the invention of diverse processes involving the use of dangerous machinery, chemic manipulations, and the continuous handling of poisonous substances by employees; the division of labor, with its inevitable demands upon the individual

for ceaseless activity in one certain direction; and the constant daily use of one set of muscles and nerve-elements, have made occupational disease an important branch of scientific medicine.

1. THE MORAL HAZARD IMPLIED BY CERTAIN OCCUPATIONS.

It has already been stated that all companies decline persons of notoriously bad habits or those whose means of livelihood are such as to suggest immoral living. Prostitutes, mistresses, gamblers, convicts, brothel-keepers or attendants, and others of similar callings are notoriously short lived and uncertain in tenure of life.

Prohibited risks.

Bartenders and saloon-keepers are not generally regarded as insurable save for short terms, and at an advanced premium rate. No doubt there are many honest and healthy men in these callings, and not infrequently such individuals are total abstainers, but the test of actual experience has shown that they can not be insured profitably save at extraordinary premiums.

By reference to Table on page 162 one will readily see that the mortality among publicans aged forty to sixty-five years greatly exceeds the average mortality. So that we need not wonder that an eminent insurance authority believes an addition of 25 per cent. to the mortality element of the premium a prerequisite to their insurance. From 10 to 15 per cent. is added to gross premiums by the English companies.

Publicans.

Distillers, wholesale liquor dealers, brewers and brewery employees, traveling salesmen for liquor or tobacco houses, bar supplies, mineral waters, etc., should be placed in the same category, for the constant temptation before them and their contact with the saloon men and the high-living, hard-drinking classes make heavy daily drinking almost a necessary part of the business. Even hotel-keepers are looked upon as indifferent risks from the same standpoint, and proprietors of small hotels especially have great difficulty in getting insurance. Those in the larger hostelries are often doubtful risks, but usually succeed in getting such insurance as they want.

Associated callings.

Many other similar occupations will suggest themselves, but those mentioned will suffice for purposes of illustration. Speak-

ing broadly, any occupation that tends to bring about irregularity in living, combined with more or less constant contact with intemperate people and the constant opportunity for and ever present temptation to overindulgence in drink, should render him who follows it uninsurable at ordinary rates.

Brewers, distillers, wholesale liquor men, and proprietors of the larger hotels should, in the author's opinion, be insured at ordinary rates only when total abstainers and after a careful investigation of their former habits. Even such measures do not fully protect, for many of this class start out as total abstainers, or are at least very temperate in early life, yet succumb to temptation in later years.

2. EXCESSIVE MENTAL STRAIN.

Too little attention has been devoted by writers upon insurance to this factor in the etiology of disease. We are told, and that truly, that the worship of Venus, Bacchus, and Vulcan is accountable for an enormous number of ailments. To this triad should be added Mammon and possibly Pallas. No one can doubt the disastrous effect of long-continued mental strain or violent or depressing emotions. Many medical men express disbelief in the fatal effect of a "broken heart"—that ailment which from time immemorial has been the stand-by of the romantic poet or novelist. Such may be interested in the following case that occurred in the author's service at the St. Paul City Hospital: A patient suffering from typhoid fever passed uneventfully through a somewhat mild attack and entered upon his convalescence full of one great desire—namely, to go home to see his young wife, to whom he was evidently devotedly attached. He finally became well enough to undertake the journey, and was given his discharge. On the very day set for his departure a telegram came telling him that his wife had taken her own life. He was prostrated by the news, and almost immediately developed a severe cardiac pain, associated with a mitral obstructive murmur. A severe and incessant headache made its appearence, and in a few days his hair had become gray. There could be no question as to all this having been the effect of the mental shock he sustained. The author, at

The "strenuous life."

"Broken heart."

least, can never again doubt the possibility of the whitening of the hair in a night, nor of the production of severe or fatal organic disease by nervous shock. In the light of these facts it becomes easier to understand the part played by continuous worry, sorrow, or even of more pleasurable though no less violent emotions.

Chronic worry.

Managers of great estates, speculators in stocks or grain, executive officers of railroads, the man who is harassed by family illness and pecuniary losses, all such are liable to feel the strain, and in them it is prone to find its expression in neurasthenia, dyspepsia, Bright's disease, arteriosclerosis, apoplexy, insanity, or suicide.

Effect of "hard times" upon the death-rate.

Periods of financial depression leave a multitude of diseases and thousands of deaths in their wake. All have seen men under such conditions age twenty years in a five-year period. For this reason companies are loath to accept any man who is financially embarrassed, and great care should be exercised in the acceptance of speculators or others of like environment who have a family history which shows an hereditary tendency to any of the diseases before mentioned. Physicians are included in this class; indeed, they may come within almost any one of our divisions. The physician in general practice is never rested, his mind never free from care and worry, his emotions are kept almost constantly in play, his sleep is broken, his hours for meals are irregular, while he is constantly exposed to special danger from infection and accident. Judged strictly by the tables of relative mortality, the doctor would seem to be a poor risk; but he is not discriminated against by the companies, and indeed it would be a shame if any obstacle were thrown in the way of a man whose increased liability to early death arises solely from his unselfish and heroic devotion to a profession which has for its object the amelioration or relief of suffering and the prolongation of human life.

The physician as a risk.

3. SANITARY CONDITIONS.

In such occupations as involve the confinement of a large number of persons in cramped quarters, the ventilation is often poor. In former years, before special legislation had been

brought to bear upon manufactories, the hygienic laws were terribly neglected, and crowded, dark, filthy, and ill ventilated work-rooms were the rule.

The cotton mills' employees often worked in an atmosphere not only poisonous from such causes, but filled with a fine and irritating dust that arose from the sizing of cotton with china clay,—a fraudulent procedure intended to give weight to the cheaper grades of cotton goods,—while, as if to add to the danger and discomfort, a moist, hot atmosphere was maintained. The same was true of the flax mills. In pottery works the temperature was sometimes 148° F. In mines the conditions were even worse; and yet in these earlier times men, and with them their wives and little children, worked for months at a time from five o'clock in the morning until nine or ten o'clock at night. What wonder the employees became old men at thirty, and very generally died thirty years short of their proper expectation! Even now we may see such hells in the sweat-shops of large cities, which are a disgrace to our boasted civilization.

Cotton mills.

Pottery works.

Sweat-shops.

4. THE OCCUPATIONS INVOLVING RISK OF POISONING.

The number of these occupations has increased in late years, and victims of slow poisoning by substances used in manufacturing form a very respectable percentage of the cases occurring in the public or private practice of the physician located in a manufacturing city.

Arsenic, for example, must be milled, grounded, and smelted, and employees may be poisoned by either fumes or dust. It is used in tinting wall-paper, in the manufacture of certain anilin dyes, in coloring toys, in artificial flowers, lithographing, and shot making. It enters into the dyeing of certain woolen goods, hangings, curtains, stockings, veils, cretonnes, red-striped bed-ticking, and Turkey-red cotton. Magenta is the dye in which it is most used. Taxidermists and playing-card makers may also suffer from arsenic poisoning.

Occupations in which it is used.

It may be worth while to refer to the leading symptoms—viz., dryness and irritability of the mucous membranes of the whole respiratory tract and of the conjunctiva; a peculiar

Symptoms.

anemia, intractable dyspepsia, colic, mucous discharges from the bowels, puffy lids, palmar eruptions, eczema, sores, and ulcers. Almost any form of skin eruption may be due to its action. Neurasthenia in its most pronounced form, arsenic-neuritis, tremor, headaches, vertiginous attacks, tinnitus. Loyd particularly emphasizes the need of remembering that we encounter a toxic hysteria. One should never forget that in severe chronic poisoning arsenic may almost always be found in the urine.

Mercury.—In mining regions the workmen in smelters are especially exposed to the fumes of metallic mercury. The workmen in quicksilver mines are also much affected.

It would not seem likely, at first thought, that hatters would suffer from mercurial poisoning, but such is actually the case. Acid nitrate of mercury is used in felting, being applied with a brush, but the danger appears to be in the later process of finishing, which involves the application of heat and the generation of very poisonous fumes.

Mirror making, less now than in former times, may cause poisoning ; and rarely, from handling, cases may develop in makers of barometers and thermometers.

Symptoms.—The chief symptoms are the stomatitis and sialorrhea and nervous symptoms similar to those of arsenic poisoning, anemia, dyspepsia, diarrhea, joint and bone pains, and edema may occur.

Lead.—All engaged in the following occupations may suffer from lead-poisoning : Lead smelters; refiners; sheet lead rollers; lead-pipe makers ; shot-makers ; type-founders ; type-setters ; lead-toy makers ; plumbers (from solder fumes) ; painters ; furniture workers in lacquer, especially polishers, gilders, bronzers. Silk, thread, or alpaca may be treated with lead acetate to weight the material, and thus become sources of poisoning ; lace-makers , artificial-flower makers ; makers of wall-papers, flint-glass workers, glaziers (putty) ; enamel workers ; glazing pots and pans, cards, cardboard, and brick may give rise to lead-poisoning ; makers of brass instruments ; and weavers, straw-hat sizers, file-cutters, makers of white lead, red lead, and litharge ; calico printers ; snuff and tobacco may contain lead as an adulteration.

Symptoms.—Anemia, wasting, blue line on the gums, lead-

colic,—*i. e.*, severe pains, griping, centered about the umbilicus and not relieved by a movement of the bowels,—paralysis (particularly drop-wrist), headaches, contracted kidney, optic atrophy, tremor. The tremor of lead-colic persists in repose, but is increased by voluntary movement. Muscle cramps are common. All forms of cerebral disturbance may occur, from headaches to delirium or actual insanity.

Phosphorus.—Phosphorus-poisoning is now rare in its chronic form. It is confined to the workers in match factories, and more particularly to such as handle the parlor matches. The most characteristic feature is the necrosis of the maxillary bones. It attacks most frequently the lower jaw.

Copper.—It is often difficult to distinguish copper-poisoning from that of arsenic or lead, zinc, tin, etc., with which it is often alloyed or contaminated.

Bronze is composed of copper, tin, zinc, and lead.

Brass of copper and zinc, with sometimes tin and lead.

Nickel plating is sometimes done with an alloy of copper, nickel, iron, and tin. Hence, workers in brass, nickel-plating, and bronze may suffer from chronic poisoning. Scrapers of old copper sheets, bell-metal workers, stove makers, pin makers, etc.

Symptoms.—The most curious symptom is the discoloration of the hair, which is said to have in some cases turned a vivid green. The teeth may also show greenish-blue coloring about the neck of the tooth. Even the urine is said, by Chevallier, to be green and to color anything with which it comes in contact. Gastric, intestinal, and bronchial symptoms as in arsenic.

Zinc and tin may produce chronic poisoning.

Chromium is largely used in calico printing; chrome yellow is made of lead and chromium; potassium bichromate is used in photography; chrome green, in printing bank-notes, and in staining glass and porcelain. Dyers use it as a mordant in dyeing silk, linen, and wool.

Symptoms.—It causes curious ulcers and perforating sores of a most intractable nature. A characteristic feature is *perforation of the nasal septum.*

Chlorin is chiefly used as a bleaching agent, and is employed in the bleaching of linen, cotton, bones, ivory, and of the rags for paper making. It is, of course, an irritant to the respiratory

passages and all mucous membranes ; hence, it leads to conjunctivitis and asthma, and predisposes to phthisis.

Bromin and Iodin.—Workers in bromin suffer from bronchial irritation, and are subject to phthisis.

Sulphur.—Those who work in sulphur are liable to poisoning.

Carbon bisulphid is largely used in rubber working, particularly in the vulcanizing process. It is also employed in the arts as a solvent for sulphur, iodin, oils, etc.

The *symptoms* are worthy of notice. There is headache, sometimes simulating a trifacial neuralgia, vertigo, and even convulsive seizures resembling epilepsy ; staggering gait, muscular pain, and formication may be present. The patient becomes highly emotional, sings, laughs, weeps, and is irritable, or even violent. Restlessness in sleep, insomnia, nightmare, mania, and suicide may follow. The special senses are curiously affected : taste is intensified, smell is overwhelmed by a constant odor of carbon bisulphid, amblyopia is common ; sexual appetite and power are increased ; great depression and mental enfeeblement may follow, and hyperesthesia and exaltation of the mental faculties and special senses give place to the opposite condition. It is easy to see how blindly a physician might sometimes work did he not have in mind the possibility of such poisoning.

Anilin is poisonous in itself and also in the arsenic with which it is so frequently combined and the nitro-benzol which is used in its manufacture. The manufacture of various anilin dyes is a very unhealthful occupation. The symptoms are both gastro-intestinal and nervous.

Turpentine may produce poisonous effects in painters working in a poorly ventilated place, where large quantities of the fumes are liberated.

Tea.—Tea tasters sit day after day before a little revolving table upon which are placed in little cups the samples of tea they are to test. The aroma is inhaled, a mouthful taken, and in most cases spat out. Five or six hundred specimens may be tasted in a single day. Some doubt exists as to the extent of the poisoning produced, many of those engaged being healthy,

strong men ; but it is probably productive of neurasthenia and dyspepsia in many cases.

Dust.—The effects of occupations involving the inhalation of dust are too numerous to admit of more than a brief and partial discussion. The grinding of steel, especially forks and needles, is deadly in its effects, particularly if the dry methods be used and fans not provided. It is said that the average age at death of needle grinders was formerly only twenty-five years, and that few individuals lived to be over thirty. The diseases induced are bronchitis, asthma, emphysema, and finally a destructive inflammation of the lungs. The process is undoubtedly tuberculous in most cases.

It almost passes belief that the workers in these deadly trades did everything in their power to obstruct measures undertaken for their benefit, fearing that lower wages would result, and preferring high mortality with high wages. *Miners, potters, glass-, gem-, and stone-cutters, cotton-* and *flax-workers, millers,* and *workers in bleaching powder* also suffer from similar ailments.

Millers show a very high mortality from phthisis, and, as they frequently apply for insurance, should not be accepted if the family history be in the least tainted or if their physique be not good.

Brush-makers, hatters, wool- and *fur-workers, bone-* and *ivory-workers* are to be regarded in the same light.

Tobacco-workers.—It is doubtful if any specific ill effects can be traced to the handling of tobacco.

Heat.—We can only touch upon this subject. It is astonishing what high temperatures can be borne without serious injury if the air be dry. Our seamen on the monitors at Santiago worked in a temperature of 160° F. or more. It is claimed that ovens as hot as 340° F. have been entered by workmen. Employees of sugar refineries suffer greatly from moist heat as well as from noxious gases and the constant handling of the syrup and sugar products.

5. OCCUPATIONS INVOLVING INJURIOUS EXERCISE.

Many occupations are objectionable because of the cramped position necessitated, others because of excessive use of a particular portion of the neuromuscular system.

"Funnel breast" and "huckster's throat."

We have all seen that peculiar depression of the lower sternum which the Germans call *trichte brust* (funnel breast), and can sometimes trace it to an occupation which in early life has involved continuous pressure over this region. Clergyman's sore throat, huckster's, auctioneer's, and military officer's laryngitis and pharyngitis are really fatigue neuroses due to excessive use of one set of muscles. Telegrapher's and writer's cramp are of the same nature. Piano-players sometimes suffer from a similar affection, so also type-setters, milkers, bricklayers, artificial-flower makers, seamstresses, tailors, and many others.

Miner's nystagmus.

Diansant and Snell, quoted by Loyd, give a very interesting description of a nystagmus which develops in miners working underground. This is explained by the fact that they work in a constrained position with their eyes fixed for long periods on a particular spot in front of and above them.

Lens-grinders frequently work in a dark room, use their eyes continually, and are in danger of inhaling the glass and emery dust as they bend over their lathes.

Occupation which involves continuous standing leads to varicosities and to congestion of the pelvic viscera. Women, of course, suffer more than men because of the congestion occurring at the menstrual epochs, which makes such a position one of positive danger and discomfort. Most of our commercial

Saleswomen.

houses now provide seats for their saleswomen, but even then the busy nature of the occupation does not admit of their being put to much use, and we find anemia, pelvic disease, and neurasthenia very common among this class of workers. Various body deformities are known to result from constrained positions, such are the high shoulders and spinal curvature of those bearing heavy burdens or, to a less degree, of the clerk. "Bow-legs" is very common in jockeys. Tile-layers and roof-makers may have the same inflammation of the patellar bursa which occurs

"Housemaid's knee."

in floor-scrubbers, and is generally known as housemaid's knee.

We all know of the general nervous exhaustion and strain which is undergone by locomotive engineers. A curious form

Engineer's bladder.

of irritable bladder is common in this class. It would seem probable that similar effects must be seen in those who run electric cars through our crowded streets.

Trombone-players and glass-blowers suffer from emphysema,

and the latter are often infected with syphilis through the transfer of blow-pipes from mouth to mouth. But many of these effects of occupation do not seriously affect the longevity of the individual, and are of no special concern to the examiner for life insurance.

6. RISK FROM ACCIDENT.

In most of the following occupations the risk is increased by liability to accident:

Acid-makers.
Aeronauts.
Ax-grinders—lung disease and risk of injury.
Band-sawyer—risk of injury.
Barkeepers—moral hazard, use of stimulants.
Billiard saloon-keeper—moral hazard, use of stimulants.
Boatman—direct risk of accident.
Brewery employees—moral hazard, use of stimulants.
Bridge-builders, except superintendent—risk of injury.
Button-makers—using saw or drop.
Buzz-sawyer.
Captains and officers of vessels.
Carpenter on vessels.
Cattle-tenders.
Circular-sawyer.
Circus-riders.
Cooper (machine worker).
Slag-roller.
Slag-tapper.
Spoutman at cupola.
Cotton-weigher.
Cowboys.
Cutlery-grinders.
Cutlery-polishers.
Deck-hands.
Detectives.
Deputy-sheriffs.
Drivers of beer-wagons.
Divers.
Drillers in shaft, quarrymen.
Drovers.
Drop-forgers.
Linemen.
Carbon-trimmers.
Engineers on steamboats.
Engineer on train.
Engineer on threshing-machine.
Engineer on tug-boat.
File-finishers.
File-grinders.
Firemen, except chief of department.
Firemen on locomotives or steamboats or with threshing-machines.
Fireworks-makers.
Fishermen.
Furniture-makers, such as—
  Carvers (wood).
  Framers.
  Grooving-saw-machine-worker.
  Shapers.
  Stake joints.
  Surface-planers.
Horseshoer (blacksmith).
Hay-pressers.
Hod-carriers.
Horse-breaker and horse-trainer.
Horse-shipper or horse-tender (in transit).
Hunter.
Iron and steel workers, as follows:
  B. F., barrowman.
  " " bricklayer.
  " " casting-house man.
  " " cinderman.
  " " keeper and helper.
  " " laborer.
  " " metal-breaker.
  " " ore-crusher.
  " " scrap-shearsman.
  " " slagman.
  " " stock-house man or filler.
  " " top filler.
  " " troughman.
  R. and RM., bar-roller.
  " " " bar-rougher.
  " " " brakeman.
  " " " carpenter.
  " " " engineer of "Modoc."
  " " " laborer.
  " " " muck-catcher.
  " " " muck-hook-up-man and muck-drag-out-man.
  " " " muck-rougher.
  " " " muck-roller.
  " " " muck-shearsman.
  " " " plate-roller.
  " " " plate-rougher.
  " " " rodmill-roller.
  " " " rodmill-rougher.
  " " " sheet-roller.

Iron Foundry, carpenter.
" charger.
" cleaner.
" cupola-man.
" laborer.
" melter.
" molder.
Wire-drawer.
Irontube-workers, ball-grinder.
" " rigger.
" " roll-setter.
Iron work and roof, workmen.
Bessemer steel-workers.
Cindermen or ash-wheeler.
Electric light trimmer.
Engineer of "Modoc."
Firemen of "Modoc."
Laborer of "Modoc."
Barman.
Bricklayer, lining furnace.
Cinder-snapper.
Craneman.
Cupola-man.
Tapper.
Trough-tender.
Cupola liner.
Laborer.
Ladleman.
Leverman at pit.
Mold-setter.
Pitman.
Pullway-man.
Runway-man.
Rail-end stocker.
Spell-hand.
Top-filler.
Vessel-man.
Rail mill.
Cinderman.
Hot and cold bed-man.
Piler or loader.
Runway-man.
Roller.
Rougher.
Leather-splitters.
Lighterman.
Lumbermen, edger.
" log-canter.
" log-dogger.
" off-bearer.
" oiler.
Lumbermen (mill), sawyer (circular-saw).
" " sawyer (buzz-saw).
" " sawyer (band-saw).
" " sawyer (gang-saw).
" " setter (circular-saw).
" " tail-sawyer.
" " trimmer.
" " planing-mill employee.
" " flooring-machine operator.
" " molding machine.
" " shaping.
" " chain-tender.
Lumbermen (mill), universal woodworker employee.
" " lumberman, in wood.
Lumbermen
Brakeman on logging train.
Conductor " " "
Engineer " " "
Jack-screwer.
Laborer.
Log-chopper sawyer.
Peeler.
Raftsman.
River-driver.
Skid-greaser.
Sniper.
Swamper.
Teamster.
Machinists.
Machine thresher.
Mates of vessels.
Miners.
Oil-refining.
Still-man.
Treater of oil.
Pilot.
Postal-clerks.
Prospector-mining.
Pulp-mill sawyer.
Quarryman.
Ranchman.
Roofer.
Sailor.
Salamander-breaker.
Saloon-keeper—moral hazard and accident.
Salt-block employees.
Dipper.
Sash- and blind-maker.
Seaman.
Shingle-bolter.
Shingle-jointer.
Shingle-sawyer.
Ship-rigger.
Slater.
Furnaceman.
Slag-roller.
Tapper.
Smelter.
Stave-cutter.
Stevedore (roustabout).
Stock-farmer (?) (tending stock).
Stove-works.
Iron-breaker.
Thresher.
Timber-hewer.
Timber-roofer.
Towboatman.
Trapper.
Vitriol-makers.
Well-digger.
Windmill-builder.
Wiremaker.
Wire-drawer.
Wood-chopper.

As an indication of the curious difference of opinion as to insurability which prevails among insurance companies in regard to the acceptance and rejection of risks, the author takes the liberty of quoting from an article by Wm. F. Standen, Actuary of the United States Life Insurance Company.

The first column in the table is the occupation. There are three other columns, headed "R," "A," and "M."

"R" gives the number of companies that positively and emphatically reject persons in the given occupation.

"A" indicates the number of companies that accept persons of the occupation without restriction, and for the plan applied for.

"M" indicates the number of companies that exercise a discrimination, either in the way of granting only an endowment insurance or of charging an extra premium rate.

	R.	A.	M.
Actor,	1	23	2
Actress,	5	19	2
Analytic chemist,	1	23	2
Army officer,	15	13	6
Ax-grinder,	15	7	4
Baggage-master,	2	14	10
Bailiff,	5	19	2
Baker, boss,	2	21	3
Baker, journeyman,	4	18	4
Brewery chemist,	10	6	10
Bargeman,	6	11	9
Baseball-player,	13	12	1
Billiard-marker,	11	12	3
Blacksmith,	...	24	2
Blast-furnace employee,	10	12	4
Boatman,	7	11	8
Boring-machine tender,	7	18	1
Brass-founder,	6	15	5
Brass-polisher,	7	14	5
Brass-finisher,	7	14	5
Bridge-builder,	4	7	15
Buzz-sawyer,	18	6	2
Cable-road employees,	5	17	4
Canal-boatman,	7	12	7
Canal-bridge swinger,	6	16	4
Canal-dockmaster,	5	17	4
Canal-locktender,	5	17	4
Officer or clerk, coasting vessel,	4	13	9
Officer or clerk, seagoing vessel,	4	9	13
Officer or clerk, lake vessel,	2	10	14
Engineer, coasting vessel,	10	4	12
Engineer, seagoing vessel,	10	4	12
Engineer, lake vessel,	10	4	12

	R.	A.	M.
Fireman, coasting vessel,	11	4	11
Fireman, lake vessel,	11	4	11
Fireman, seagoing vessel,	11	4	11
Carpenter and joiner,	...	26	...
Cattle-tender in transit,	14	10	2
Ship-calker,	4	20	2
Celluloid-worker,	18	6	2
Chair-shaper,	3	21	3
Chemist (manufacturing),	4	19	3
Circular-sawyer,	14	5	7
Fireman, paid department,	8	7	11
Fireman, volunteer department,	7	15	4
Crucible steel-worker,	12	10	4
Fire-clay miner,	13	8	5
Common laborer,	7	13	6
Compositor, day work,	2	21	3
Compositor, night work,	5	18	3
Cutlery-grinder,	18	5	9
Cutlery-finisher,	14	10	2
Cutlery-polisher,	14	10	2
Cutlery-forger,	5	19	2
Driver, delivery wagon,	1	24	1
Driver, ice-wagon,	4	19	3
Electrician,	5	15	6
Electric light inspector,	9	14	3
Electric light engineer,	10	12	4
Electrotyper,	5	19	2
Farm laborer,	2	22	2
File-finisher,	13	10	3
File-grinder,	19	5	2
File-forgeman,	6	17	3
Fire patrolman,	9	14	3
Blast-works employees,	11	8	7
Fisherman, sea,	14	5	7
Gravity railroad employees,	10	11	5
Grinder of edge-tools,	18	3	5
Hodcarrier,	17	4	5
Horse-trainer,	17	6	3
Hunter,	15	10	1
Knot-sawyer,	18	5	3
Steam shovel laborer,	16	8	2
Leather-splitter,	9	16	1
Lighterman,	13	11	2
Limestone quarrier,	15	7	4
Limestone burner,	9	15	2
Lumber-mill emyloyees,	7	14	5
Lumberman in yard,	3	21	2
Lumberman in woods,	13	10	3
Machinist,	13	21	2
Marble- or stone-worker, dry,	10	10	6
Marble- or stone-worker, wet,	10	11	5
Sheriff,	2	21	3
Sheriff, deputy,	2	21	3
Match-splint sawyer,	9	13	4
Millwright-molder,	6	17	3
Molding-machine worker,	7	17	2
Oil-mill employee,	7	15	4
Oil-well employee,	9	13	4
Oil-refinery employee,	8	14	4

	R.	A.	M.
Painter, house,	3	19	4
Painter, sign,	1	21	4
Picture-frame sawyer,	6	17	3
Pile-driver,	9	14	3
River-pilot,	5	11	10
Lake-pilot,	6	10	10
Port-pilot,	7	8	11
Sound-pilot,	5	8	13
Quarrymen,	16	4	6
Planing-mill employee,	10	10	6
Raftsman,	17	5	4
Roofer,	8	16	2
Wrecking-gang, boss,	15	8	3
Railroad engineer, passenger,	7	3	16
Railroad engineer, freight,	12	2	11
Railroad engineer, switch,	15	2	9
Railroad engineer, pumping-station,	6	17	3
Railroad fireman, passenger,	11	3	12
Railroad fireman, freight,	15	2	9
Railroad fireman, switch,	18	2	6
Railroad conductor, passenger,	2	16	8
Railroad conductor, freight,	10	5	11
Railroad conductor, construction,	14	5	7
Railroad brakeman, passenger,	14	5	7
Railroad brakeman, freight,	24	1	1
Railroad brakeman, construction,	24	1	1
Car carpenter,	...	22	4
Construction-train laborer,	20	4	2
Despatcher, yard duty,	7	11	6
Despatcher, supervising,	5	15	6
Wrecking-train laborer,	18	6	2
Flagman,	12	10	4
Targetman,	16	5	5
Signalman,	13	11	2
Sectionman,	12	9	5
Switchman, not in yard,	19	4	3
Yardmaster, active,	11	6	9
Yardmaster, supervising,	4	16	6
Saw-mill employee,	12	9	5
Slate-quarrier,	15	8	3
Slater,	14	8	4
Stonecutter, under cover,	15	9	2
Stonecutter, open-air,	12	13	1
Steel-worker,	10	13	3
Stevedore,	12	10	4
Thresher, with machine,	8	15	3
Timber-cutter,	8	14	4
Trapper,	13	13	...
Rolling- or rail-mill employee,	12	11	3
Smelter,	16	8	2
Well-digger,	21	2	3
Zinc-works employee,	19	5	2

Concerning this remarkable table Standen says: "This exhibit does not call for any extended criticism, but a careful study of it will amply repay those officers of companies who may be dis-

posed to make a critical analysis of it. It certainly proves beyond question that most extraordinary divergence of opinion exists on the subject of the degree of hazard of various occupations."

COMPARATIVE MORTALITY OF MALES, TWENTY-FIVE TO SIXTY-FIVE YEARS OF AGE, IN DIFFERENT OCCUPATIONS, FROM ALL CAUSES AND FROM SEVERAL CAUSES. 1890–1892.

	Occupation.								
	All Males.	Clergyman, Priest, Minister.	Barrister, Solicitor.	Medical Practitioner.	Draper.	Carman, Carrier.	Innkeeper.	Potter.	File-maker.
All causes,	1000	533	821	966	1014	1284	1659	1706	1810
Influenza,	34	36	45	51	44	45	46	42	40
Alcoholism,	13	2	12	14	14	17	94	9	4
Rheumatic fever,	7	11	8	3	11	9	16	8	...
Gout,	2	3	4	8	...	1	12	1	4
Cancer,	47	35	60	43	49	59	53	35	39
Phthisis,	192	67	116	105	260	195	311	333	402
Diabetes,	7	17	28	22	12	4	19	9	12
Diseases of nervous system,	102	69	104	122	102	93	148	123	212
Valvular disease of heart,	24	16	27	28	27	27	30	43	41
Aneurysm,	6	2	3	6	3	6	7	...	9
Other diseases of circulatory system,	102	64	88	96	105	133	153	178	154
Bronchitis,	88	11	17	12	58	149	89	378	188
Pneumonia,	107	45	55	93	92	184	165	135	197
Pleurisy,	7	5	1	7	5	13	10	8	4
Other diseases of respiratory system,	22	8	16	13	26	29	34	149	34
Hernia,	3	0	1	...	...	3	5	3	...
Diseases of liver,	29	18	55	60	33	27	174	32	36
Other diseases of digestive system,	26	26	29	49	29	33	42	31	36
Bright's disease,	28	27	38	56	26	27	59	45	82
Other diseases of urinary system,	16	12	10	23	10	14	27	18	22
Plumbism,	1	...	...	...	...	0	0	17	75
Accident,	56	9	22	37	19	128	47	20	39
Suicide,	15	7	18	41	15	15	29	16	31
All other causes,	66	43	64	77	74	73	89	69	149

Part II, Supplement to "Fifty-fifth Annual Report of the Registrar-General," from "Vital Statistics," Newsholme.

EFFECTS OF ALCOHOLIC EXCESS.

	Alcoholism and Diseases of Liver.	Alcoholism.	Diseases of Liver.	Gout.	Diseases of Nervous System.	Suicide.	Phthisis.	Diseases of Urinary Organs.
Occupied males, . . .	100	100	100	100	100	100	100	100
Coachman, cabman, .	153	215	122	300	100	143	124	132
Costermonger, . . .	163	277	107	150	170	100	239	171
Coalheaver, ...	165	223	137	...	120	50	116	122
Fishmonger, ...	168	215	144	150	109	150	86	120
Musician, ...	168	223	141	450	135	164	174	141
Hairdresser, ...	175	269	130	400	109	250	149	78
Dock-laborer, ...	195	400	96	150	139	157	176	166
Chimney-sweep, . . .	200	454	78	...	100	221	141	144
Butcher, ...	228	269	207	300	128	164	105	117
Brewer, ...	250	315	219	500	152	121	148	190
Inn-servant, ...	420	815	230	550	132	179	257	188
Inn-keeper, ...	733	708	744	600	195	229	140	220

From "Vital Statistics," Newsholme.

DISEASES OF RESPIRATORY AND CIRCULATORY SYSTEMS.

Occupation.	Phthisis and Diseases of Respiratory System.		Phthisis.	Diseases of Respiratory System.	Diseases of Circulatory System.
	Mortality Figure.	Ratio.	Mortality Figure.		
Agriculturist, ...	221	100	106	115	83
Engraver, artist, ...	279	126	146	133	96
Shopkeeper (class), ...	350	158	172	178	117
Commercial clerk, ...	390	176	218	172	115
Butcher, ...	404	183	195	209	157
Saddler, ...	417	189	248	169	133
Watchmaker, ...	427	193	234	193	94
Shoemaker, ...	437	198	256	181	121
Draper, ...	441	200	260	181	135
Tobacconist, tobacco manufacture, ...	461	209	280	181	109
Tailor, ...	466	211	271	195	121
Hairdresser, ...	489	221	276	213	179
Hatter, ...	511	231	301	210	141
Musician, ...	522	236	322	200	191
Printer, ...	540	244	326	214	133
Bookbinder, ...	543	246	325	218	115

Supplement to the "Fifty-fifth Annual Report of the Registrar-General," part II, from "Vital Statistics," Newsholme, London, 1899.

OCCUPATIONS NECESSITATING THE BREATHING OF DUST-LADEN AIR.

OCCUPATION.	PHTHISIS AND DISEASES OF RESPIRATORY SYSTEM.		PHTHISIS.	DISEASES OF RESPIRATORY SYSTEM.	DISEASES OF CIRCULATORY SYSTEM.
	Mortality Figure.	Ratio.	Mortality Figure.		
Ironstone-miner,	294	133	90	204	84
Carpenter,	326	148	172	154	106
Coal-miner,	366	166	97	269	120
Corn-miller,	366	166	143	223	112
Baker, confectioner,	392	177	185	207	130
Blacksmith,	392	177	159	233	136
Wool manufacture,	447	202	191	256	131
Tin-worker,	451	204	217	234	124
Carpet, rug manufacture,	471	213	226	245	87
Bricklayer, mason, builder,	476	215	225	251	130
Cotton manufacturer,	540	244	202	338	152
Lead-worker,	545	247	148	397	272
Chimney-sweep,	551	249	260	291	142
Stone-quarrier,	576	261	269	307	137
Zinc-worker,	587	266	240	347	126
Iron and steel manufacture,	645	292	195	450	162
Gunsmith,	649	294	324	325	153
Copper-miner,	678	307	331	347	121
Copper-worker,	700	317	294	406	186
Lead-miner,	705	319	380	325	142
Glass manufacturer,	740	335	295	445	157
File-maker,	825	373	402	423	204
Tin-miner,	885	400	508	377	95
Cutler, scissors-maker,	900	407	382	518	167
Potter, earthenware-manufacturer,	1001	453	333	668	227

Supplement to the "Fifty-fifth Annual Report of the Registrar-General," part II, from "Vital Statistics," Newsholme, London, 1899.

COMPARATIVE MORTALITY FIGURES OF MALES, FROM TWENTY-FIVE TO SIXTY-FIVE YEARS OF AGE, ENGAGED IN DIFFERENT OCCUPATIONS.

OCCUPATION.	COMPARATIVE MORTALITY FIGURE.			
	Calculated on Four Age-groups.	Calculated on Two Age-groups. (Modified Mortality Figure.)		
	1890–1892.	1890–1892.	1880–1882.	1860, 1861, 1871.
All males,	1000	1000	942	960
Males in selected healthful districts,	679	693	...	...
Occupied males,	953	947	910	...
Unoccupied males,	2215	2338	2065	...
Clergyman, priest, minister,	533	547	524	605
Gardener, nurseryman, seedsman,	553	568	564	642
Farmer, grazier,	563	591	595	673
Schoolmaster, teacher,	604	571	677	893
Grocer, etc.,	664	664	726	744
Laborer, etc., in agricultural districts,	666	681	660	...
Coal-miner (Derby and Notts),	727	693	691	...
Sawyer,	768	789	802	798
Artist, engraver, sculptor, architect,	778	777	868	955
Carpenter, joiner,	783	779	772	831
Barrister, solicitor,	821	820	793	882
Fisherman,	845	843	752	786
Shopkeeper (including stationer, chemist, tobacconist, fishmonger, fruiterer, grocer, draper, ironmonger),	859	856	827	...
Medical practitioner,	966	957	1058	1073
Tailor,	989	999	990	1043
Wool, worsted manufacturer (W. Riding),	996	986	971	
Bricklayer, mason, builder,	1001	1002	913	1033
Coal-miner (Lancashire),	1069	1026	874	...
Law-clerk,	1070	1028	1084	1536
Butcher,	1096	1066	1103	1130
Printer,	1096	1048	1009	1144
Plumber, painter, glazier,	1120	1091	1132	1234
Cotton, linen manufacture (Lancashire),	1176	1122	1024	...
Carman, carrier,	1284	1247	1201	...
Slater, tiler,	1322	1305	888	1078
Tool, scissors, file, saw, needle-maker,	1412	1398	1198	1169
Brewer,	1427	1407	1282	1552
Innkeeper, inn-, hotel-servant,	1659	1665	1525	1490
Potter, earthenware, etc., manufacture,	1706	1639	1638	1390
File-maker,	1810	1791	1569	1548

Part II, Supplement to the "Fifty-fifth Annual Report of the Registrar-General," "Vital Statistics," Newsholme.

Deformities Due to Occupation.—Many occupations produce more or less characteristic deformities: Railroad brakemen rarely escape the loss of one or more fingers. Deformities

"Railroad hand" and "factory leg."

in pack peddlers and rag-pickers, the lowered shoulders of clerks and tailors are well known. In the days when children of tender years were allowed to work in factories a form of bandy-leg, known as "factory leg," was distressingly common.

Much more might be written upon this subject, but enough has been said to illustrate the peculiar effects of occupation upon the bodily health and the longevity of individuals.

7. STIGMATA OF OCCUPATION.

It is said that no less than forty distinct occupations may leave characteristic evidence upon the persons of such as follow them, and the clinicians, examiners, and detectives find such signs of great service.

A famous Scotch physician, who is said to have possessed the faculty of close observation and logical deduction to a remarkable degree, remarked to his class on one occasion that the patient before them had at one time been a soldier. The statement was promptly denied by that individual and as strongly reaffirmed by the clinician. The argument was then abruptly terminated by forcibly stripping the struggling victim and exposing a branded letter D, which proved him to have been not only a soldier, but a deserter.

The soldier.

One frequently has occasion to note the erect and soldierly bearing of the man who has seen military service. Even when lying in bed in the hospital ward such an one will often assume the attitude of "attention" when approached or addressed by the visiting physician.

At a time when reenlistment was not allowed in certain services of the English army old soldiers would try to evade the rule by enlisting under an assumed name in another regiment. They were almost invariably detected by the drill sergeant despite their attempts to appear ignorant of all army requirements, and a favorite ruse consisted in approaching the supposed raw recruits from behind and suddenly shouting "attention." In nine cases out of ten the correct position was instantly assumed, and the imposture stood revealed.

The sailor.

Sailors may be known by the nautical emblems and devices

tattooed upon various portions of their bodies, and their nationality is frequently indicated by a flag or coat of arms.

Criminals are also prone to resort to this kind of decoration, but their marks are usually of a different character, and their hands are soft and free from the callosities indicative of manual labor. The true name of a person unknown or one passing under an alias may be thus indicated in full or by initials, and the name of a sweetheart may be similarly suggested. Such tell-tale markings have frequently proved of assistance in criminal cases. The criminal.

Callosities have been carefully studied, and frequently prove of great value in determining occupation; for example, *the carpenter* may be known by a callosity at the thenar eminence of his working hand, and upon the dorsal surface of the first and second phalanges at the radial border of his index-finger. Callosities.

The banjo, guitar, and harp players have callosities upon the finger-tips of both hands; whereas the *zither player* would have callosities only upon the finger-tips of the left hand and the ulnar surface of the tips of the index-, middle, and ring-finger of the right. *The violinist* would have the same marks on the left hand alone.

Chimney-sweeps, particularly those of ancient times, had callosities and bursal enlargements over the outside of both knees. This resulted from the necessity for gripping the sides of a chimney with the knees in climbing.

Compositors have callosities on the palmar aspect of the thumb and index-finger of the working hand.

In drummers these callosities involve the thumb, index- and middle fingers of both hands and the front of the right thigh; in *fencing-masters*, the ulnar border of the palm of the right hand; and in *hand-organ men*, the outer side of the right hip and thigh.

Seamstresses roughen the radial border of the terminal phalanx of the left thumb and index-finger.

The old-fashioned *shoemaker* has callosities on the fold of the distal joint of the right index-finger, the outer border of the thumb and left index-finger, and upon the front of the left thigh. The nail of the left thumb is scarred and deformed by the awl.

Tailors have a ring-shaped callosity on the right thumb and

index-finger, the left index-finger and thumb are roughened by the needle-point, and there are bursal enlargements over the external malleoli.

Prostitutes may generally be distinguished from working-girls by their soft hands. A certain number bear tattoo marks.

In *watchmakers* the right thumb-nail is frequently broken and deformed by the constant opening of watch-cases.

Turners have a curious callosity at the outer border of the right little finger and also at the left metacarpophalangeal joint.

The day laborer who has used shovel and pick has a dense callosity of the palm of the right hand as well as over the palmar surface of both hands.

The clerk who uses a pen constantly may be known by a distinct thickening of the skin over the outer surface of the terminal joint of the right little finger.

Such are a few of the great number of marks more or less characteristic of occupation. Some very curious information is often obtainable through similar agencies. For example, a slight, uniformly depressed band on the ring-finger of the left hand may indicate that a woman has been married; such a band, having been protected from the sun and air by the ring, shows white against the surrounding skin. A *sailor* has tanned face and hands, and a triangular patch on the chest corresponding to the open bosom of his shirt. The *soldier* may be tanned on the face, neck, and hands, but has not the patch on the chest. If, as in the case of some foreign regiments, the vizorless cap be worn, a sharply defined mark is left, which may be oblique from wearing the hat at an angle. *Ballet dancers* might be known as such from the extraordinary development of the muscles of the calf. So also stains of dyes and acid marks leave significant evidence of occupation, just as the yellow hue of the inner surface of the index-fingers may indicate the confirmed cigarette smoker.

The wedding ring.

Stains.

To one with good natural powers of observation there is much of interest and value in this broad field of occupational stigmata.

THE EXAMINATION OF THE CHEST.

GENERAL CONSIDERATIONS AND REGIONAL ANATOMY.

Having filled out the answers to the various questions addressed to the applicant, the examiner is ready to commence the physical examination.

Must Know the Normal.—In life insurance work the physician seeks primarily to verify the applicant's declaration of good health, thus occupying an attitude slightly different from that of the clinician ; therefore, *a thorough knowledge of the normal chest is all important to the medical examiner, and, possessing it, he readily recognizes pathologic departures.*

Thoroughness and Dexterity.—*Rapidity* and *precision* are the essentials of all good work in the insurance field, and that which requires many pages of written description must consume but a few moments in its practical application.

In every case the whole chest should be examined. Many damaging errors result from the mistaken belief that careful work is too time-destroying to serve the purposes of life insurance. Nothing could be further from the truth, for as a matter of fact the skilful physician following a correct method will make a thorough examination in less time than would be required by one less skilled for the completion of a superficial one.

A common error.

The Necessary Equipment.—The necessary equipment consists of a good technic, good eyesight and hearing, a practised hand, a knowledge of the topographic anatomy of the chest, and of the physical signs of health and disease.

Essential Preliminaries.—The first step consists of a proper arrangement of the clothing. In one of the older life insurance manuals there appears a picture of an applicant ready for the physical examination. His starched shirt, collar, and necktie are not removed, but the shirts have been rolled up under the

Preparation of applicant.

armpits, leaving the chest bare from the upper border of the mammillary region downward.

This represents the method generally followed by examiners and recommended by insurance companies ten or fifteen years ago. It is to be hoped that it is no longer practised, as any examination of the lungs thus conducted is unworthy of acceptance.

The arch enemy of insurance companies is tuberculosis, and in a large majority of cases the first physical signs of this dis-

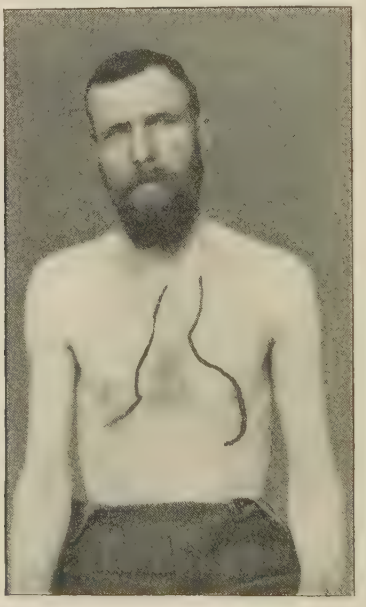


FIG. 9.—ANEURYSM. Man well nourished and healthy in appearance.

ease appear at the apex of the lung—that part which this older method of preparation almost wholly concealed.

No man, however expert, can detect and differentiate the crepitations of an incipient tuberculosis through starched linen.

The male applicant should be requested to remove his clothing down to the waist, or at least to remove coat, vest, and starched shirt. This done, the undershirt may be so adjusted as to permit the examiner to inspect every portion of the naked chest. In the case of women, the corset and any other article of dress that might seriously interfere should be taken off or so

Proper method.

adjusted as to permit a thorough and careful examination. The shoulders and upper chest should be bared in all cases, and no violence is thereby done to the modesty of any sensible woman.

To attempt a thorough examination of a man's chest with the white shirt over it is an absurd proceeding. No healthy male applicant is likely to object to baring the chest, and, as all careful examiners know, the sound man likes a thorough examination. He feels that it is something to talk about; it strengthens his faith in himself and in the company. Imperfect examinations may please the unfit, but they lower the company and the examiner in the estimation of the applicant.

It is an encouraging sign that so many of the insurers now

FIG. 10.—CARCINOMA OF BREAST (FACE).

specifically cover this point in their instructions or by a direct question upon the examination blank.

Object lesson.

As an object lesson, two photographs (Figs. 10 and 11) are here shown both of the same man, one showing his face, the other his bare chest. Such a carcinoma of the breast could and would in many instances be overlooked were not the chest uncovered, for slovenly methods of preparing an applicant for examination will almost certainly be attended by carelessness in other directions. Another photograph (Fig. 9) shows a man bearing in his face every appearance of good health, but suffering from an aneurysm of the aortic arch that caused a perceptible rise and fall of the manubrium sterni.

A costly error.

A general failure to observe a proper technic in this direction has cost insurance companies millions of dollars in early losses from tuberculosis alone.

The only reason for suggesting or countenancing irrational methods would seem to be a fear of offending the applicant or

the possibility that in the case of appointments outside of the doctor's office no proper place could be found in which to hold the examination. Inasmuch, however, as companies invariably request that examinations be made in private, and as even offices and shops have some place that can be used for such a purpose, the latter reason would seem to be a mistaken one.

The Applicant's Attitude.—The applicant's position should be easy and unconstrained, he should stand squarely upon his feet, and remain perfectly quiet during the examination. Turning and twisting the head and body, by putting tissues upon the stretch or causing muscular contraction, may seriously interfere with every step of a physical examination.

The Light.—The light should fall fairly upon the person

FIG. 11.—CARCINOMA OF BREAST (CHEST).

under examination, and the examiner should always keep it behind himself.

The subject will be dealt with under the following heads:

1. **The topographic anatomy of the thorax and the arbitrary divisions or surface areas used in physical examinations.**

2. **The Lungs. The interpretation of physical signs and the various methods by which they are elicited.**

(*a*) Inspection.
(*b*) Palpation.
(*c*) Percussion.
(*d*) Auscultation.
(*e*) Mensuration, etc.

3. **The examination of the heart.**

Scope of discussion.

No attempt will be made to discuss fully the whole field of chest examination, but rather to set forth as clearly as possible the rationale of physical signs, and the means of detecting those

morbid conditions the prompt and certain recognition of which is no less difficult than important.

Realizing that many readers will be undergraduates, and fortified by his experience as a teacher, the author offers no apology for inserting certain elementary principles which will be unnecessary to many, but must be thoroughly understood and clearly in the mind, if correct conclusions concerning morbid conditions of the heart and lungs are to be reached by the examining physician.

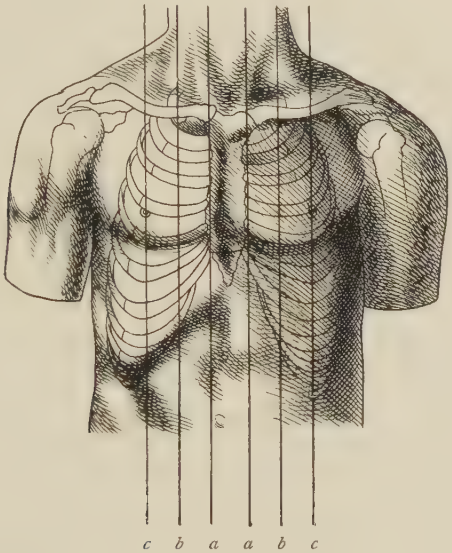


FIG. 12.—REGIONAL DIVISIONS OF THE CHEST (ANTERIOR SURFACE-VERTICALS). The various anatomic divisions are plainly indicated.

a, *a*. Sternal lines. *b*, *b*. Parasternal lines. *c*, *c*. Mammillary or nipple lines.

THE TOPOGRAPHIC ANATOMY OF THE CHEST.

Well-known Landmarks.—Certain landmarks are very useful to the examiner. The most important is the *angulus Ludovici*, that ridge which marks the junction of the manubrium with the gladiolus of the sternum. It corresponds to the *second rib, the lower border of the aortic arch, the bifurcation of the trachea, and the meeting point of the borders of the right and left lungs.* Sternal ridge.

In the male the *nipple* usually corresponds to the *fourth interspace*. The lower border of the *pectoralis major* corresponds to the *upper border of the sixth rib*. The *scapula* indicates the Various landmarks.

second rib posteriorly by its upper, the *seventh rib* or interspace by its lower angle, and the *third rib* and line of division between the upper and middle lobes of the right lung by the root of its spine.

The Regional Divisions of the Chest.—At the present time there is a tendency on the part of clinicians to depart from the elaborate and arbitrary system of division and subdivision of the surface of the chest and replace it by a simpler scheme.

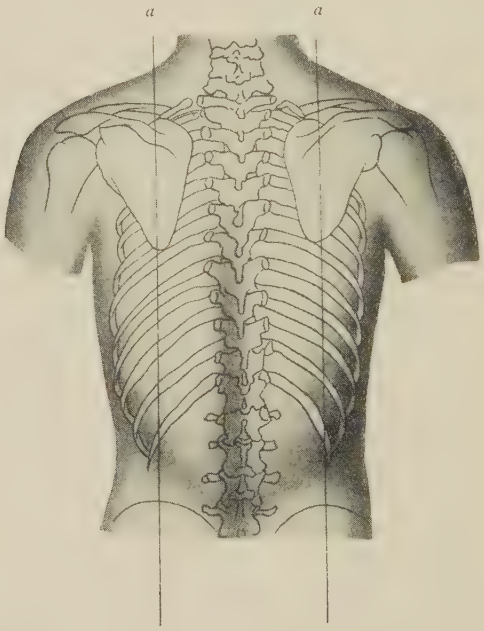


FIG. 13.—REGIONAL DIVISIONS OF CHEST (POSTERIOR SURFACE-VERTICALS). *a*, *a*. Scapular lines.

It is necessary that some definite regional division should be made to assist accurate description, and a reference to figures 12 and 13 will show the present method. Certain natural anatomic divisions are still retained. The "*supraclavicular*" region is bounded by the trapezius, sternomastoid, and clavicle; the "*infraclavicular region*" extends from the clavicle downward to the second rib; while laterally the "*axillary space*" remains. On the posterior surface the region of the lung apex is known as the "*suprascapular*," and that portion directly below

Anatomic divisions.

the scapula as the "*infrascapular space*." Between the two scapulæ lies the "*interscapular space*," and the region overlain by the scapula itself is divided by the scapular spine into the "*supra-*" *and* "*infraspinous fossæ*."

The most important lines in the modern nomenclature are the *verticals*, which are named as follows:

The verticals.

Median line, front and back. *Sternal* line, running parallel with the edges of the sternum, and the "*parasternal*" line, lying midway between the edge of the sternum and the mammillary line, which cuts the nipple. The axillary space is delimited by the "*middle*," "*anterior*," *and* "*posterior*" *axillary lines*; and posteriorly, the "*scapular line*" is drawn vertically through the inferior angle of the scapula. Using this simple system, one can accurately describe the location of any abnormal signs, and does not need to carry in his mind an elaborate system of anatomic boundaries.

THE THORACIC ORGANS.

The thorax includes within its walls, either wholly or in part, the heart, lungs, liver, spleen, and kidneys, and a thorough understanding of the normal position and relation of these structures is absolutely essential to good work.

Lung boundaries.

The Lungs.—The lungs themselves occupy nearly all of the upper portion of the chest, their apices extending as high as the seventh cervical spine behind, or an inch to an inch and a half above the clavicle in front. The right is slightly higher than the left, and their resonant percussion note may be elicited over the whole of the supraclavicular and suprascapular regions. Anteriorly, the two lungs pass downward and come into contact at the level of the sternal angle (angulus sterni); they then pass vertically downward, in contact, until the fourth rib is reached; at this point the left lung passes outward, forming the left border of the superficial cardiac area. The right lung passes downward to the sixth rib, and in the mammary line the lower border of both lungs is represented by that rib. In mid-axilla it cuts the eighth; in the scapular line, the ninth, and near the spine it corresponds to the level of the tenth spinous process.

Apices.

It will be noticed that from the mammillary line outward the lower border is practically horizontal. Below this level extends

Liver, spleen, stomach, and kidneys.

an important area that represents the position of the liver, spleen, stomach, and kidneys. The liver, lying beneath and adapting itself to the dome-like surface of the diaphragm, rises into the thorax to a much greater degree than is evidenced by percussion. Absolute liver dullness begins at the lower border of the lung and extends downward to the costal margin; its lower border, passing to the left, crosses the epigastrium some two inches below the ensiform cartilage, and blends its dullness with that of the superficial cardiac area.

Another important area is that included between the lower

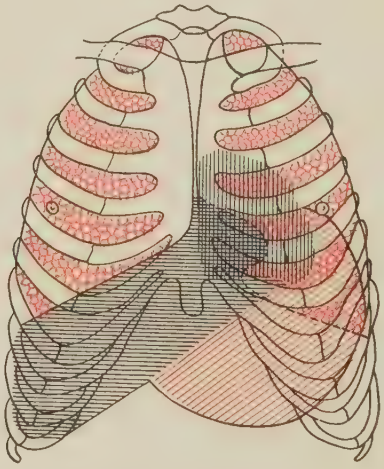


FIG. 14.—PERCUSSION AREAS, NORMAL CHEST (ANTERIOR SURFACE).
Lungs—red. Liver—horizontal black lines. Relative cardiac dullness—vertical black lines. Absolute cardiac dullness—cross-hatching. Stomach tympany—oblique red lines.

Traube's semi-lunar space.

border of the left lung, the spleen, the inferior costal margin, and the left lobe of the liver. This is known as Traube's semi-lunar space, and derives its importance largely from the fact that it is normally resonant because of the underlying stomach, and, further, because the pleural border occupies its upper part.

Lower boundaries of pleuræ.

The pleuræ extend much lower than the lung margin, being two inches inferior in the mammary line; reaching a maximum of four inches in midaxilla, and one and one-half inches in the scapular line. It will thus be readily seen that any effusion of fluid into the left pleural sac will, if free, produce an area of

movable or shifting dullness in the upper portion of Traube's space, and that any increase in the size of the left lobe of the liver or of the spleen may reduce its lateral dimensions.

The spleen lies normally under the ninth, tenth, and eleventh ribs, its anterior border corresponding to a line drawn from the sternoclavicular junction to the point of the twelfth rib. When enlarged, it encroaches upon Traube's space, passing downward and forward in the direction of its normal axis, and being, like the liver, markedly affected by the movements of the diaphragm,

Respiratory mobility.

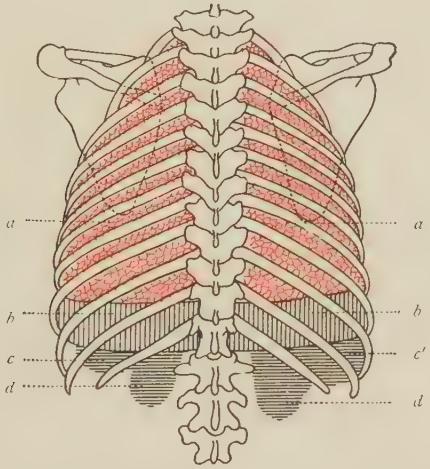


FIG. 15.—PERCUSSION AREAS (NORMAL CHEST, POSTERIOR SURFACE).
a, a. Lungs. *b, b.* Pleural space. *c.* Spleen. *c′.* Liver. *d, d.* Kidneys. Area *b, b* yields percussion dullness from spleen, kidneys, and liver, unless lungs are distended.

it descends in inspiration, ascends in expiration. From the foregoing it appears that, excepting the area of superficial and deep cardiac dullness, the whole anterior portion of the chest-wall from the apex of the lungs downward to the sixth rib is normally resonant by reason of underlying lung tissue.

Normal resonance.

Posteriorly, pulmonary resonance extends as low as the ninth or tenth rib ; below this point there is on the right side percussion dullness due to the presence of the liver, while on the left lie Traube's space, the spleen, and the kidney.

The Lobes of the Lung.—A line drawn from the second

dorsal spine to the middle of the sixth costal cartilage divides the lung into its upper and lower lobes. On the right side a second line drawn from the middle of the first line to the fourth chondrosternal joint marks the upper boundary of the middle lobe. The front of the chest, therefore, represents the upper, the back the lower, lobe, the apex being accessible both anteriorly and posteriorly, and the middle lobe on the right occupying a portion of the axilla and the anterior surface.

Relation to surface.

Movements of the Lungs.—There is normally a well-defined respiratory excursion of the upper and lower borders of the

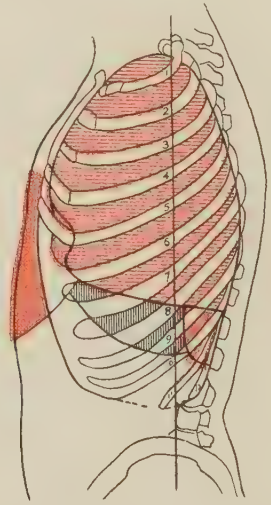


FIG. 16.—TRAUBE'S SPACE.

Bounded by the lung, spleen, and liver, and the costal margin. Shows region of pleural sinus in which movable dullness may appear in left-sided pleural effusion.

lungs most marked in the axillary region. This will be further described under Inspection and Percussion.

Position of the Heart.—The anatomic position of the heart, its valves, and its tributary vessels is, in a general way, important, but to this must be added a special knowledge of percussion outlines and auscultation areas. A reference to figure 18 shows that the heart is placed between the lungs, and presents—

(*a*) **A base,** *lying at the level of the upper border of the third costal cartilage.*

(*b*) **A right border,** *curving from the right base downward to*

the sixth chondrosternal articulation, and attaining a distance of one or one and one-half inches from the right sternal border under the fourth cartilage.

(*c*) **A left border,** *which curves outward to the nipple line, and then inward to a point one inch within that line in the fifth interspace.*

(*d*) **A lower border,** *connecting the lower extremities of the lines representing the right and left borders.*

The Aorta.—*From the base the aorta sweeps upward and to the right, its right border projecting slightly beyond the sternal*

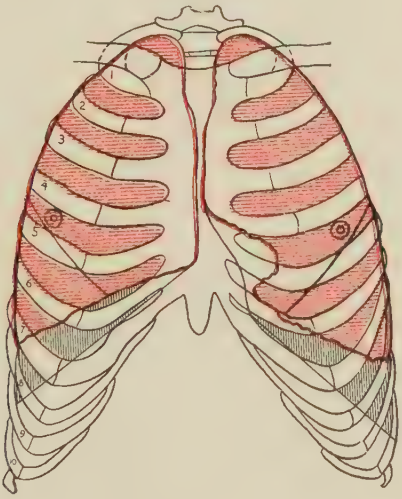


FIG. 17.—LUNG BOUNDARIES (ANTERIOR SURFACE). (*Modified Pansch-Fowler.*)

margin; it then passes backward and toward the left in such a manner as to leave the manubrium of the sternum resonant under normal conditions.

Manubrium normally resonant.

Range of Movement.—By means of the attachments of the blood-vessels entering its base, the heart is suspended freely within the pericardial sac, and is thus adapted to a considerable range of movement.

It should be remembered that the heart presents anteriorly its *right* chambers, and chiefly the right ventricle, the left ventricle being represented, under normal conditions, by a mere strip of heart-muscle along the left border.

Right heart anterior.

The four valves are so near together as to permit their being

The valves.

almost covered by the mouthpiece of a large stethoscope, and their exact position is a matter of comparative indifference to the examiner. The heart is nearly covered by the lungs, save that the border of the left lung is so notched when it reaches the fourth rib as to leave a portion of the right ventricle uncovered and in close proximity to the chest.

Incisura cardiaca.

Superficial Cardiac Area.—This uncovered portion gives us the area of percussion dullness known as the *superficial cardiac area.* In actual practice this is a somewhat triangular space of marked percussion dullness, having its base at the left sternal margin from the fourth to the sixth chondrosternal articulation,

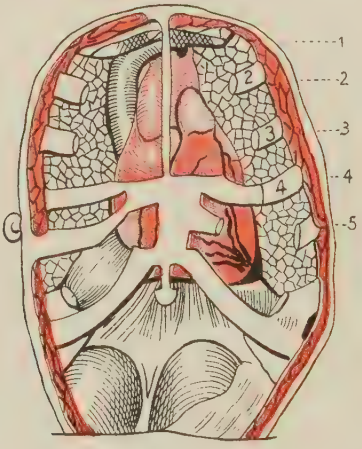


FIG. 18.—RELATION OF HEART AND GREAT VESSELS TO CHEST-WALL.—(*After Sibson.*)

and its apex at or just within the apex-beat, the triangle being completed by lines drawn to connect these points. (See Fig. 14.)

Relative Dullness.—It is so difficult to outline the normal heart as a whole that modern diagnosticians are content to use two percussion areas as representing the normal and serving to determine and measure any change in the boundaries of the enveloping lung or in the size of the heart. That known as the area of relative or deep dullness is well shown in figure 14.

Apex-Beat.—The apex-beat, or visible and palpable heart impulse, is normally found at a point an inch within and one and one-half inches below the male nipple, or, better stated, in the fifth interspace, an inch within the nipple line.

Normal location.

THE EXAMINATION OF THE CHEST (Continued).

HEART AND BLOOD-VESSELS.

The examination of the heart should be completed before that of the lungs is commenced.

THE PULSE.

Pulse-taking should precede even the mention of a physical examination.

Technic.—A correct technic is of the first importance if one expects to obtain information of value. *The pulse should in every case be taken simultaneously in the two radials. Three fingers should be applied to the vessel. The applicant's arms should be similarly placed, and the position assumed should be free from restraint and allow no flexion or muscular compression of the vessels, or in any way obstruct the direct or return circulation.*

In insurance examinations even more than in private practice due allowance must be made for the nervousness incident to examination and for the effects of physical exertion.

It is possible and always best to take the pulse in a casual manner while talking of other things. As before stated, it should always be taken before the chest is examined, as it is invariably accelerated during that procedure.

Points to be Determined.—(1) Abnormal thickening of the artery. (2) The size of the artery. (3) Its tension. (4) Whether or not the beats are equal and their rhythm regular and uniform. (5) Their frequency or rate. (6) The question of correspondence of the pulse of one side with that of the other.

When the examiner's fingers are applied to the artery, several questions are decided almost simultaneously; these are the size of the pulse or rather of the artery, its fullness, and the force of the beat.

The vessel is rolled under the finger and its outline noted. Pressure is made with the upper finger, and the force necessary

Tension.

to cut off the pulse below carefully noted.* This determines "tension." What constitutes high, moderate, or low tension is only to be learned by experience.

Arterio-sclerosis.

While the artery is thus compressed above, it is rolled under the finger to determine the question of arterial thickening (arteriosclerosis). *Under these conditions the normal vessel can not be felt as a distinct tube.* If so felt, it is the seat of sclerosis, and this may vary from mere palpability to a rigidity like that of a fine quill. Indeed, in senile atheroma one may distinctly feel the placques formed by the deposit of lime-salts.

When to Take the Pulse.—The best time to take the pulse is just before the review of the questions is completed, and while the applicant's mind is given over to some point in the family or personal history. The worst times are: (*a*) At the beginning of an examination. (*b*) After forced breathing and chest examination. (*c*) At the end of an examination.

Tachycardia and Bradycardia.—A pulse that runs above 85 calls for the use of a temperature thermometer, and any persistently high pulse should during its continuance make ordinary life insurance unattainable.

Causes of tachycardia.

Aside from *organic heart disease*, sexual neurasthenia, incipient tuberculosis, tobacco, the overuse of stimulants, and overwork, physical and mental, are the commonest causes of tachycardia, and if after several attempts the pulse still remains rapid, the case should be postponed pending further instructions from the home office. Both the very rapid and the very slow pulse are said to be in rare instances physiologic, but such cases are so rare as not to justify an insurance company in accepting at ordinary rates the ninety-nine bad risks to secure one good one.

Bradycardia.

A pulse as low as 20 to the minute has been reported in an apparently healthy man, and one of six to the minute just before death, but the later record shows that in the former case the man died suddenly only a few months after the observation was made. An abnormally slow pulse should always suggest disease of the heart with or without valvular lesion or associated renal disease.

In these modern days we do not regard the pulse with that

* *Recurrent Pulse.*—Not infrequently a free anastomosis makes it necessary to shut off the ulnar as well as the radial artery.

veneration so general in earlier times, nor read into it the diverse and varied shades of meaning then recognized. We do, nevertheless, find in pulse-taking a most valuable diagnostic aid, and would not feel like applying to it the old term, *res fallacissima*. Res fallacissima.

What the Pulse Represents.—It is essential that one should understand that the pulse represents simply "the degree and duration of increased pressure in the arterial system caused by the ventricular systole" (Broadbent on "The Pulse"). It also serves as an index to the mean pressure which is the resultant of the force of propulsion on the one hand and the peripheral resistance on the other. "Arterial tension" and "blood pressure" are equivalent terms. Arterial tension and blood pressure.

The apparent expansion and contraction have no real basis. The artery is simply more or less full and tense, and the actual expansion is too trivial to deserve notice. Having these simple facts in mind, the understanding of the variations in the pulse is greatly simplified.

Strength and Force.—This measures the strength of the heart, for with a weak heart there can not be a strong pulse, though the converse is not true, for there can be a weak pulse with a strong heart. The latter condition means either that—

(*a*) An insufficient amount of blood is passed on into the circulation during systole, as is the case in pulmonary or mitral lesions or overrapid heart action.

(*b*) That the initial pressure is not maintained, as in aortic regurgitation. Significance and inferences.

(*c*) That the capacity of the peripheral vessels is unduly increased by vasomotor relaxation.

(*d*) That the total volume of the blood is reduced.

It is also true that a strong, forcible pulse is not necessarily an effective one, as is readily seen in a case of chronic interstitial nephritis, when the strong hypertrophied left ventricle is pounding with but indifferent results against the barrier erected by contracted capillaries.

High Tension Pulse.—A persistent high tension pulse is an important symptom, usually a serious one, and it should and can be recognized in every instance.

If a normal pulse be represented by ○⊂, the high tension would be ○○ ; that is to say, it is a pulse that gives a relatively

weak *impulse*, because the artery remains full between the beats. The chief characteristic is, therefore, *sustained tension*. The second characteristic is the apparent rigidity of the arterial tube. It may be rolled under the fingers if the artery be not compressed above, and often may be distinctly seen as it beats, particularly if a curve be present in the vessel at that point. Such a pulse is likely to be somewhat slow, and is distinctly deliberate; that is to say, its rise and fall is like the slow lift and heave of a ground swell.

Its characteristic feature.

Causes of High Tension.—One pulse of high tension is physiologic; this is the postprandial pulse, the high tension pulse that follows a hearty meal, and the insurance examiner needs to bear it in mind and be not overhasty in his conclusions, but rather postpone and try again. Such a pulse is found only after an unusually heavy meal, the rule being that owing to compensatory vascular relaxation the postprandial pulse is of somewhat low tension.

Postprandial pulse.

Fleeting High Tension.—Such a pulse accompanies the "*insurance heart*," and is due merely to temporary overaction, subsiding promptly as the heart steadies down.

Persistent High Tension.—This is the important variety and invariably points to a constitutional defect. Broadbent describes an interesting form met with in children, which he believes is distinctly hereditary, indicating oftentimes a family history of apoplexy, renal or heart disease. He believes that in many cases it is an individual idiosyncrasy, but even if this be true, the condition bodes ill for the individual.

Important and pathologic.

The chief conditions causing such a pulse are gout, chronic interstitial nephritis, old age, gouty diabetes, lead-poisoning, mitral stenosis, and pregnancy.* The latter condition might be suggested by such a pulse in a female applicant, and would be a matter of great importance.

Causes.

INSPECTION.

General Inspection.—The visible evidences of poor circulation, as afforded by the appearance of cyanosis, pallor, pulsation

* Broadbent on "The Pulse."

of vessels, dyspnea, and similar signs, are considered under General Inspection and the Special Cardiac Lesions.

Inspection.—In local inspection two things are chiefly to be considered—(*a*) the presence, position, force, and extent of pulsations. (*b*) Bulging of the precordial area.

Pulsation.—Normally, a visible or palpable pulsation is present at the apex, and in an insurance examination the beat may be unduly diffuse and forcible even though the heart be wholly

Normal apex-beat.

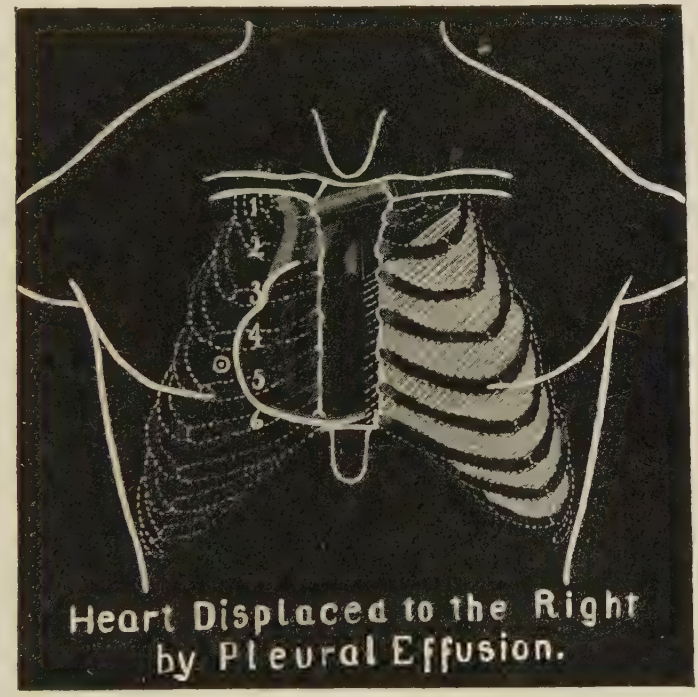


FIG. 19.

sound. It should properly be represented by a gentle rhythmic uplifting of an area not more than an inch in diameter.

If the rib directly overlie the apex, or the applicant be unusually fat, the beat of a normal heart may be wholly invisible. When present, it is essentially a visible pulse, and from it one may determine the rate, rhythm, and force of the ventricular contractions.

Position.—Furthermore, as the heart is movable and capable

of dilating or of undergoing hypertrophy, the apex-beat by its displacement may indicate a change in the heart's position or an increase in its size. Such changes may be thus epitomized:

Displacement of the Apex-beat.—

Upward,	(*a*) High position of diaphragm. (*b*) Tympanites. (*c*) Ascites. (*d*) Abdominal growths. (*e*) Pericarditis with effusion.
Upward and to left,	(*a*) Effusion into right pleural sac { (*a*) Liquid. (*b*) Gaseous.
Downward,	(*a*) Aortic aneurysm. (*b*) Mediastinal tumor. (*c*) Senility. (*d*) Hypertrophy of left ventricle. (*e*) Collapse of abdominal viscera.
To right or left,	(*a*) Hypertrophy and dilatation. (*b*) Effusion of gas or fluid into pleural sac—*i. e.*, pneumothorax, hydrothorax, etc. (*c*) Unilateral emphysema. (*d*) Pleural adhesion and retracted lung. (*e*) Marked solid enlargements of lung or of the left lobe of the liver.
Apex-beat may be invisible by reason of	(*a*) Interposition of rib. (*b*) Fat chest-wall. (*c*) Feeble heart. (*d*) Emphysema. (*e*) Edema of chest-wall. (*f*) Pericardial effusion (marked). (*g*) Pleural effusion. (*h*) Transposition of the viscera (is present on right side).
Its area and apparent force may be increased because of	(*a*) Nervous excitement. (*b*) Hypertrophy or dilatation. (*c*) Retraction of lung.

In short, *the heart may be pushed, pulled, or thrust out of its normal position or be temporarily or permanently overactive or enlarged.*

Hypertrophy.

The Heaving Impulse.—Such a beat is indicative of cardiac hypertrophy. The *chest-wall* rises and falls and the hand feels a lifting heave instead of the gentle impulse of the normal beat. In such cases the pulse is ordinarily strong and deliberate.

Dilatation.

The Wavy Impulse.—An extensive impulse of a wavy indecisive type points to dilatation. In both instances the evidence of enlargement as shown by percussion must supplement mere inspection or palpation.

In such cases the pulse may be weak, unequal, and disturbed in rhythm.

Systolic Retraction.—True systolic retraction due to pleuropericardial adhesion is rare, but when present involves a con-

siderable portion of the left lower chest, front and back. Pseudo-retraction is frequently seen in cases of marked dilatation. True and false.

Pulsations in Other Parts of the Precordial Region.—Pulsation in regions other than that of the apex may or may not be abnormal, and here, as elsewhere, a nervous overacting though sound heart may lead the examiner to a false conclusion.

If the chest-wall be thin and the heart action strong and tumultuous, a pulsation *may* appear in the third, fourth, and fifth left spaces and in the upper portion of the epigastrium.

FIG. 20.—ANEURYSM (AORTIC).
This man took out life insurance but a short time before photograph was taken.

Ordinarily, however, such pulsations are abnormal and associated with cardiac dilatation, emphysema of the lungs, anemia, neurasthenia, or emaciation due to wasting diseases such as tuberculosis and cancer.

Pulsation at or about the Manubrium.—A pulsation at the manubrium itself or in the interspaces on either side is extremely important as suggesting aneurysm or a malignant growth. This region should always be inspected, for an *early* diagnosis of aneurysm is as rare as it is important. Neuralgic or rheumatic Aneurysm.

pains about the chest should always suggest a special inquiry in this direction.

Bulging of the Precordial Region.—This is rarely seen save as a part of general deformity of the chest or as indicating some heart lesion dating back to youth or childhood.

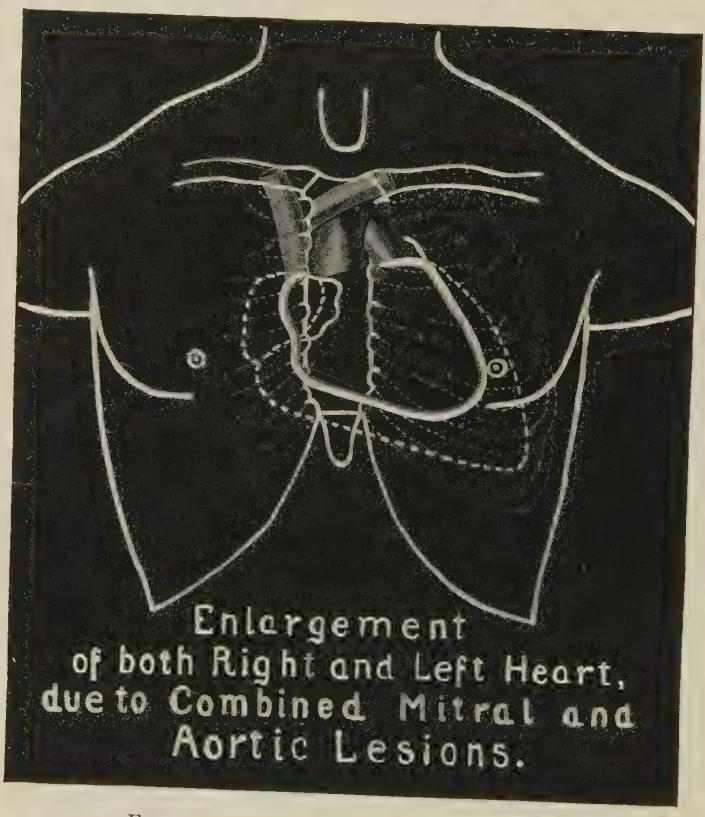


FIG. 21.—Dotted lines indicate percussion area.

PERCUSSION.

Percussion of the heart is very easily and rapidly carried out. To determine the deep or relative cardiac dullness the examiner should percuss with moderate force along lines converging toward the center of the heart, beginning always well outside the normal limits. If the heart be normal a *marked* increase in resistance and rise of pitch will occur just within the nipple line on the left, the third cartilage above, and the left sternal edge on the

right.* The lower border is so closely in contact with the liver as to make its delimitation difficult. *Very fine shades of dullness as elicited by heavy percussion had best be disregarded.*

Superficial Cardiac Area.—To percuss the superficial cardiac area it is better to commence at the center of known dullness and percuss lightly in lines radiating from that center until the note

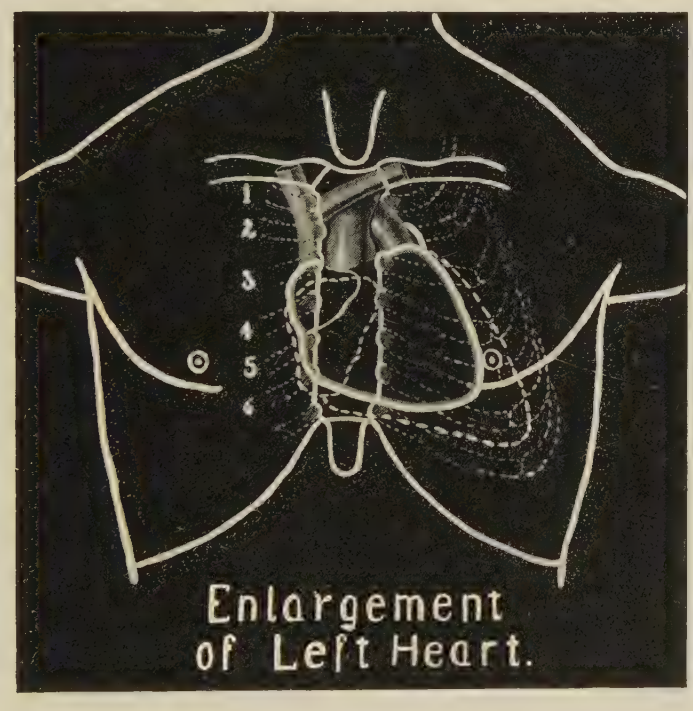


FIG. 22.—Dotted lines indicate percussion area.

of relative dullness is obtained. *Percussion over the manubrium sterni should never be omitted.* (See Fig. No. 14.)

Significance of Changes in Percussion Areas.—Increase in the area of superficial dullness means usually one of three things :

(*a*) Enlargement of the heart.

(*b*) Retraction of the lung.

(*c*) Pericardial effusion.

* Some clinicians make the right sternal margin or mid-sternal line the right boundary of relative dullness.

Dilatation without murmurs.

The examiner should always have in mind the fact that serious dilatation of the heart may manifest itself in an increased area of dullness though no murmur be present. Moreover, the shape of the area of relative heart dullness often assists a diagnosis. A reference to the three figures (Nos. 21, 22, and 23) will show the effect of hypertrophy of the left ventricle, of the right ventricle, and of both combined, and one readily sees how suggestive may be the different outlines to an examining physician.

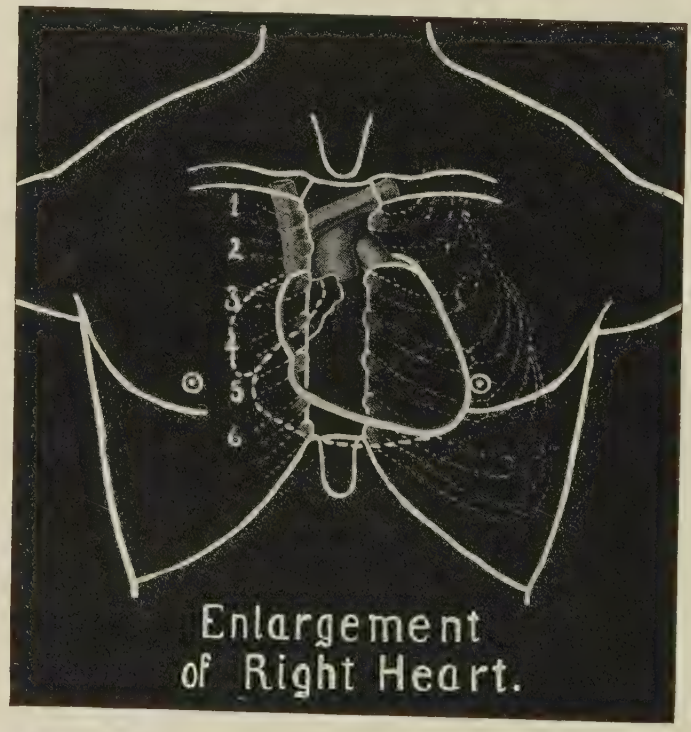


FIG. 23.—Dotted lines indicate percussion area.

AUSCULTATION.

By auscultation one determines

(*a*) *Valvular competence ;*

(*b*) *The condition of the heart muscle ;*

(*c*) *Tension in the aortic and pulmonary circuits.*

It is essential that the normal sounds be held clearly in mind.

One then seeks for two things : (*a*) Abnormal heart-sounds ; (*b*) unusual accentuation of heart-sounds.

THE HEART-SOUNDS.

The First Sound.—A thorough understanding of the mode of production and normal accentuation of the heart-sounds is absolutely essential to the intelligent interpretation of heart murmurs. The *normal* accentuation is on the first sound at the apex, on the second at the base. Disregarding conflicting theories and fine distinctions, one may say that the essential element in the production of the first sound is the contraction of the ventricular walls and the coincident closure of the auriculoventricular valves. This being true, it follows that *abnormal accentuation of the first sound, as heard in any one of the four auscultation areas, indicates an overacting left ventricle.* The cause for such overaction may be increase in strength, as in *hypertrophy* from valvular disease, *nervous overaction*, or *excessive contraction of a partly filled ventricle*, as is the case in *mitral stenosis.* A further cause is to be found in *heightened arterial tension* such as results from *arteriosclerosis*, *chronic toxemia*, and *interstitial nephritis.*

The normal.

Accentuation of first sound.

The Second Sound.—The second sound is produced by the simultaneous closure of the aortic and pulmonary valves that immediately follows ventricular contraction.

It will at once be seen that the loudness of this second sound must primarily depend upon the integrity of the valves themselves, and must measure the amount of that recoil which is the resultant of the force of propulsion and the resistance encountered in the artery. By inference one can say that *any increase in general arterial tension will produce an accentuation of the aortic second sound*, and that a *similar increase in tension or any obstruction to the pulmonary circulation will result in an accentuation of the pulmonary second sound.* In both cases the amount of accentuation will, in a great measure, depend upon the soundness of the valves, the strength of the ventricles, and the integrity of the mitral and tricuspid leaflets.

Accentuation of second sound.

Practical Application.—Much information is afforded in both acute and chronic disease by a study of the variations in accentuation. For example, lobar pneumonia must inevitably be accompanied by marked accentuation of the pulmonary second sound,

Pneumonia, mitral, and aortic disease.

and a dangerous tendency to dilatation of the right ventricle. If this dilatation become extreme, the pulmonary second sound is markedly weakened, and if tricuspid regurgitation occur, it may be wholly lost—a sign of the gravest import.

The pulmonary congestion incident to mitral stenosis and regurgitation makes accentuation of the pulmonary second sound

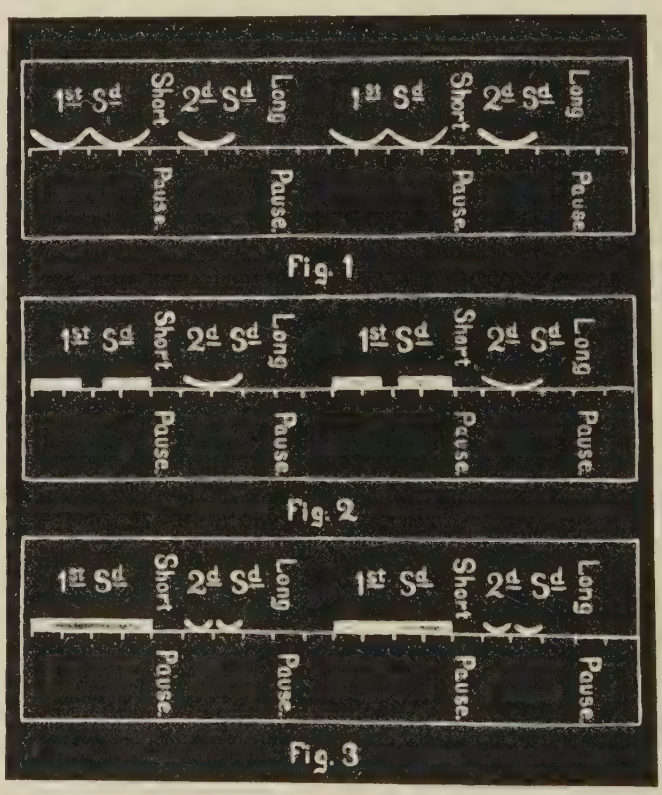


FIG. 24.—DIVISION AND REDUPLICATION OF THE HEART-SOUNDS. Fig. 1. Reduplication of the first sound. Fig. 2. Division of the first sound. Fig. 3. Division of the second sound.

an important diagnostic feature. As in pneumonia, so also in mitral lesions a loss of this accentuation may be a serious symptom. The first sound as heard at the apex may be wholly replaced by a murmur of mitral regurgitation, and both aortic stenosis and incompetence tend to obscure the second sound in the aortic area. In mitral stenosis the aortic second sound is

weakened, and in aortic regurgitation the first sound at the apex is obscured.

Reduplication of Heart-sounds.—The normal heart-sounds consist of two systolic and two diastolic sounds so blended as to form a single systolic and diastolic sound because of the synchronous closure of the valves of the right and left heart. Under many

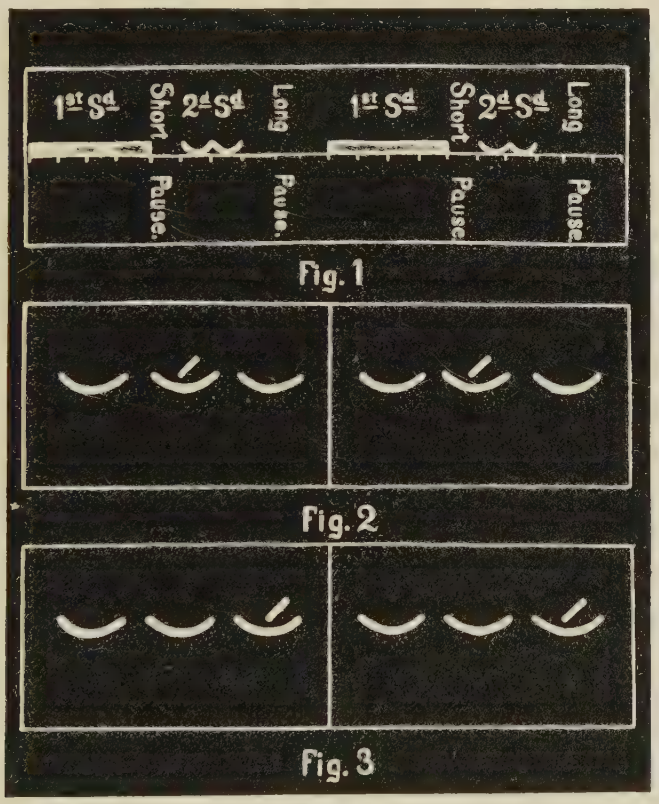


FIG. 25.—REDUPLICATION AND DIVISION OF THE HEART-SOUNDS.
Fig. 1. Reduplication of the second sound. Figs. 2 and 3. Gallop rhythm.—(*After Vierordt.*)

conditions this synchronism is so interfered with as to produce doubling or actual division of one or both sounds. The phenomenon of reduplication has aptly been compared to the sound produced by the closure of double swinging doors. A normal heart if temporarily overacting (insurance heart) may be the seat

"The swinging doors."

of doubling of the heart-sounds; but in general it may be said that, hearing a reduplicated second sound at the apex, one should suspect the presence of *mitral stenosis or myocardial degeneration.*

Gallop rhythm is a form of reduplication that may be graphically represented. (See Fig. 25, Nos. 2 and 3.)

It may be heard in certain cases of slight incompensation, and in interstitial nephritis, emphysema, and arteriosclerosis, but is usually strongly suggestive of severe incompensation and extreme cardiac weakness.

Auscultation Areas.—The four surface areas for auscultation are

(1) The *mitral area* (apex),
(2) *Tricuspid area* (lower half of sternum),
(3) *Pulmonary area* (second left intercostal space),
(4) *Aortic area* (second right intercostal space).

Points of maximum intensity.

These points do not correspond to the exact location of the valves, but represent the areas in which the sounds of the respective valves or their associated murmurs are best heard.

Heart Murmurs.—A heart murmur is an extraneous sound of cardiac origin tending to obscure or partly or wholly replace the normal heart-sound, and directly related to it in rhythm.

"Insurance Heart."

No correct conclusion can be drawn from the examination of an overrapid, tumultuously beating heart.

Under such conditions errors occur in two directions: (First) Existing organic murmurs are obscured, and (second) still more frequently, organic murmurs are reported where nothing more than a temporary dynamic or accidental murmur or harsh heart-sound exists.

For most persons a life insurance examination is an ordeal, and for a time, or at different periods during the procedure, the heart action may be much accelerated.

Race.

Race exercises a peculiar influence, and whereas one rarely finds a pulse rate above seventy in the Scandinavian or North German, the reverse is true of the American or the men of the Latin races, who often require careful and tactful treatment if a proper pulse rate is to be obtained.

Accidental or temporary murmurs.

Functional or accidental murmurs are extremely common, and are occasionally very puzzling. But rest, reassurance, and, if

necessary, reexamination are usually sufficient to make clear the actual condition.

Important Sources of Error.—As regards *true murmurs*, certain general facts must be borne in mind.

Posture.—Posture is important, and all patients or applicants

FIG. 26.—ANEMIA.—(*Sansom.*)
Usual site of murmur—pulmonary area. (Fifty-nine per cent. of cases.)

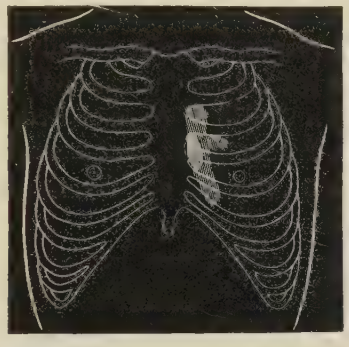


FIG. 27.—ANEMIA.—(*Sansom.*)
Murmur over right ventricle and conus. (Eleven per cent. of cases.)

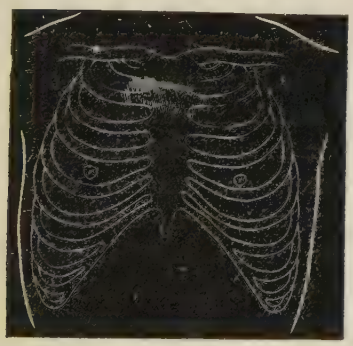


FIG. 28.—ANEMIA —(*Sansom.*)
Murmur in aortic area. (Eleven per cent. of cases.)

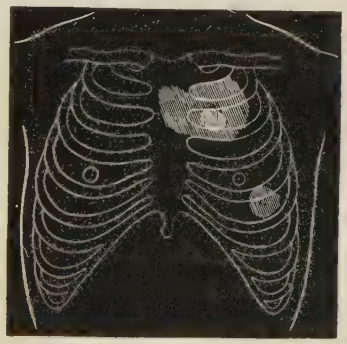


FIG. 29 —ANEMIC MURMURS.—(*Sansom.*)
Coexisting pulmonary and apex murmurs. (Nine per cent. of cases.)

should be examined in both the recumbent and the erect position.

Murmurs of regurgitation are usually best heard when the patient is recumbent, those of obstruction when he stands erect. Some of the latter may at times appear only at the

moment a patient reaches the perpendicular and then rapidly subside.

Stethoscopic Pressure.—The effect of stethoscopic pressure is most important and comparatively little known. In the author's experience all vibratory murmurs, of which mitral stenosis is the chief, may be completely removed or much diminished if too much stethoscopic pressure be applied. On the other hand, moderate pressure usually intensifies the blowing systolic murmurs, unless one excepts the hemic murmurs which Sewell of Denver believes are obliterated by stethoscopic pressure.

Intensity of Murmurs.—It must further be borne in mind that, speaking broadly, the seriousness of a murmur is in inverse proportion to its loudness—*i. e.*, the louder the murmur the better the prognosis, this dictum being based upon the logical assumption that the stronger the heart and narrower the opening the louder is the murmur, the latter portion of the assumption applying especially well to cases of mitral or tricuspid regurgitation.

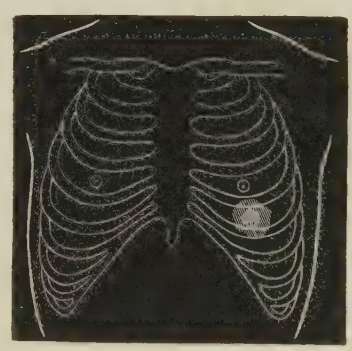


FIG. 30.—ANEMIA.—(*Sansom.*) Systolic apex murmur. (Seven per cent. of cases.)

Hemic Murmurs.—The murmurs associated with anemia are systolic in time and blowing in character, are seldom widely transmitted, and are usually best heard over the pulmonary area (second left intercostal space). They are heard less frequently over the apex, and differ from the true murmur of mitral regurgitation in the fact that they have not the same transmission to the axilla and back.

Characteristics and differentiation.

So also when heard over the aortic area (second right intercostal space) they lack the transmission into the carotids and subclavian characteristic of true aortic stenosis. Their association with anemia and disappearance under appropriate treatment further serve to differentiate them in practice.

Such murmurs call for postponement until their cause has been removed and the murmurs themselves have entirely disappeared. Associated dilatation is uncommon, and when present

is slight. A few cases of diastolic hemic murmur have been reported.

The Normal Circulation.—Figure 31 shows that, *practically*, the lungs are interposed between the two sides of the heart. The right heart, receiving venous blood from the body, passes

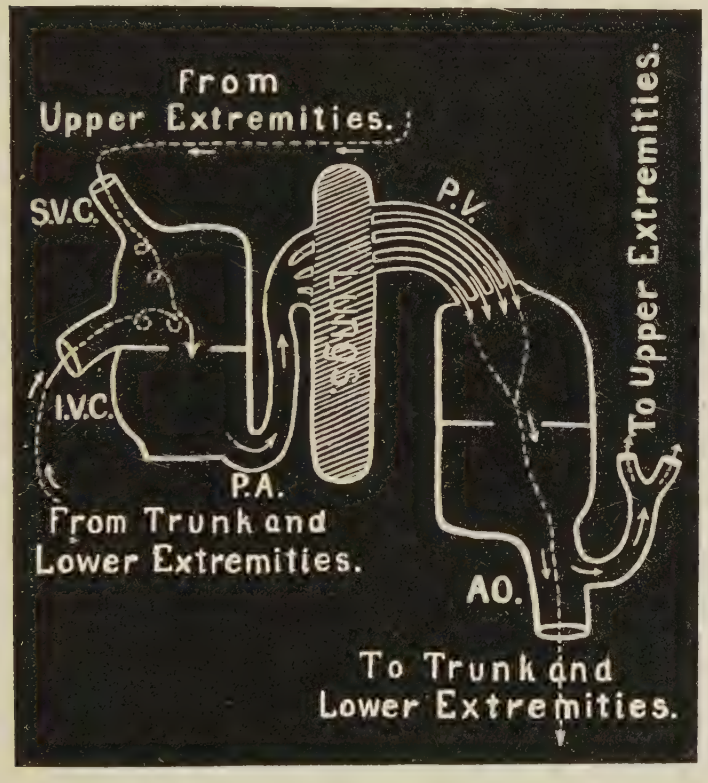


FIG. 31.—RIGHT AND LEFT HEARTS.
S.V.C., I.V.C. Superior and inferior venæ cavæ. P.A. Pulmonary artery. P.V. Pulmonary veins. AO. Aorta.

it on to the lungs, from which it is carried to the left heart and distributed throughout the arterial system.

The secondary effects of valvular lesions are thus clearly indicated.

Murmurs Erroneously Considered Unimportant.—One frequently reads of the cardiorespiratory murmur, but in most instances its close association with phthisis is not mentioned.

Cardiorespiratory.

The cardiorespiratory murmur is a systolic, whiffing murmur, heard best during inspiration and in the region of the heart border. It is commonly associated with pulmonary tuberculosis.

Pleuropericardial friction and rhythmic crackles.

The same statement may be made as to the association of pleuro-pericardial friction as evidenced by a friction murmur of cardiac rhythm heard best in full inspiration; or of the crackling

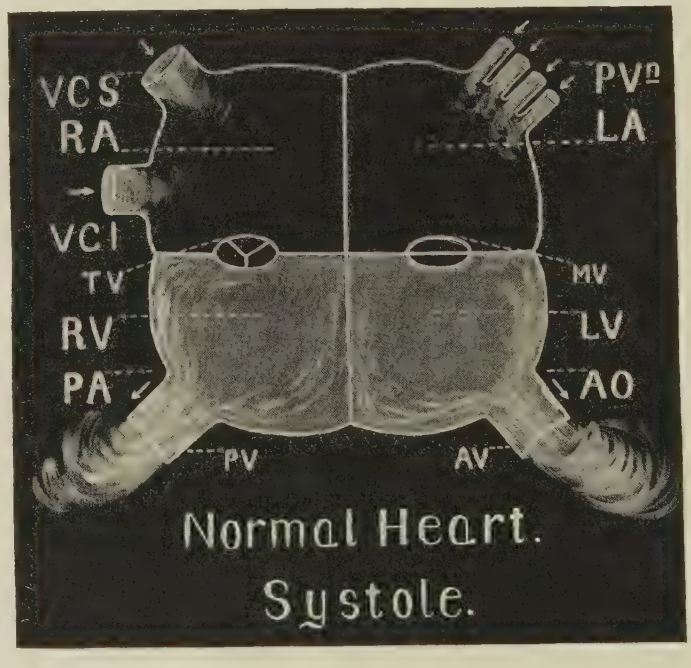


FIG. 32.—THE NORMAL HEART IN SYSTOLE. The full ventricles are contracting, the blood flows freely from them into the pulmonary artery and aorta; the mitral and tricuspid valves are tightly closed; the auricles are refilling.

MV. Mitral valve. TV. Tricuspid valve. AV. Aortic valve. PV. Pulmonary valve. LA. Left auricle. RA. Right auricle. LV. Left ventricle. RV. Right ventricle. VCS. Vena cava superior. VCI. Vena cava inferior. PVn. Pulmonary veins. AO. Aorta. PA. Pulmonary artery.

murmurs or rales heard over the right ventricle at a point between the apex and the sternum.*

If persistent, such murmurs are very important, and should always be considered a cause for postponement or special rating.

* In several instances these have seemed to be directly associated with emphysema.

ORGANIC HEART MURMURS.

Varieties.—*Organic murmurs may be valvular, arterial, pericardial, or pleuropericardial in origin.*

The valvular murmurs are of two kinds, the regurgitant and the obstructive—*i. e.*, those due to a leakage or back flow, and those due to a narrowing of the valvular opening, a stenosis. Valvular.

The heart must be regarded simply as a double pump in constant action, or as two double-chambered hearts cemented together and acting synchronously. They may be shown diagramatically as two hearts with the lungs between them, for such is the plan of the circulation (see Fig. 31).

Pouring constantly into the upper chambers comes the blood from the greater and lesser circulations. Into the right auricle the superior and inferior venæ cavæ pour their dark, impure, venous blood, while to the left, the four pulmonary veins bring a constant supply of bright red arterial blood that has undergone purification in the pulmonary air-cells. The blood passes from the auricles into the ventricles through the auriculo-ventricular valves, the mitral on the left, the tricuspid on the right, and is then forced by the ventricular contraction (systole) through the pulmonary valve into the pulmonary artery upon the right, and through the aortic valve into the aorta upon the left. As both sides of the heart contract simultaneously, the sounds produced by valvular closure are ordinarily coincident and blended into one. *The "first sound" ("lub") corresponds to the period of ventricular contraction and the closure of the mitral and tricuspid valves—i. e., systole.* (Fig. 32.) The circulation. Systole.

The instant that this contraction is effected, the emptied ventricles relax, and the aortic and pulmonary valves closing sharply to prevent backflow from the full arteries, produce by their closure the second sound ("dup"), which initiates "diastole." During this, the period of relaxation, the blood that has been accumulating in the auricles again pours down through the open mitral and tricuspid valves to fill the emptied ventricles, and just before the next systole the auricles themselves contract vigorously and ventricular contraction immediately follows. (Fig. 33.) Diastole. Presystole.

Practical Application.—*Importance of a Mental Image.*—For

the auscultator, systole is initiated by the first sound and diastole by the second. In his mind's eye he sees the cycle of events. Thus with the first sound he sees the ventricles contracting, the mitral and tricuspid valves tightly shut, the aortic and pulmonary valves freely open, and the blood rushing into the pulmonary artery and aorta. With the second sound he sees an exact

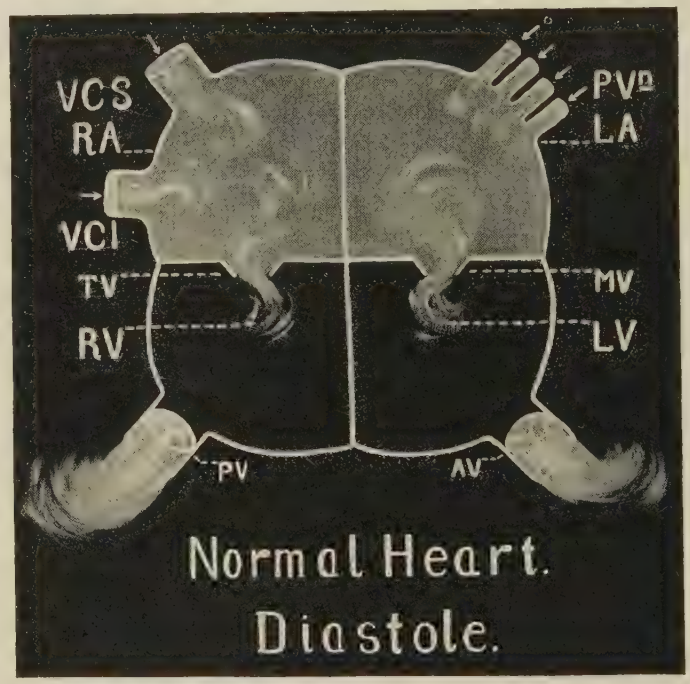


FIG. 33.—THE NORMAL HEART IN DIASTOLE. The ventricular contraction has ceased, the aortic and pulmonary valves, tightly closed, are shutting off and supporting the blood column; the ventricles are filling from the open mitral and tricuspid orifices above.

M V. Mitral valve. T V. Tricuspid valve. A V. Aortic valve. P V. Pulmonary valve. L A. Left auricle. R A. Right auricle. L V. Left ventricle. R V. Right ventricle. V C S. Vena cava superior. V C I. Vena cava inferior. P Vn. Pulmonary veins.

reversal of conditions; the aortic and pulmonary valves are tightly closed, the mitral and tricuspid freely open, and the blood is rushing through them from the auricles above to the ventricles below.

Important Deductions.—*Any organic valvular murmur that immediately follows, replaces or modifies the normal first sound* (*sys-*

tolic murmur) *must arise either from a leakage through the closed valves* (*mitral and tricuspid*) *or from an obstruction in those that should be freely open* (*aortic and pulmonary*). *Hence any organic endocardial systolic murmur must be due either to mitral or tricuspid regurgitation or to aortic or pulmonary obstruction* (*stenosis*).

Working rules.

In diastole the opposite conditions prevail ; the mitral and tri-

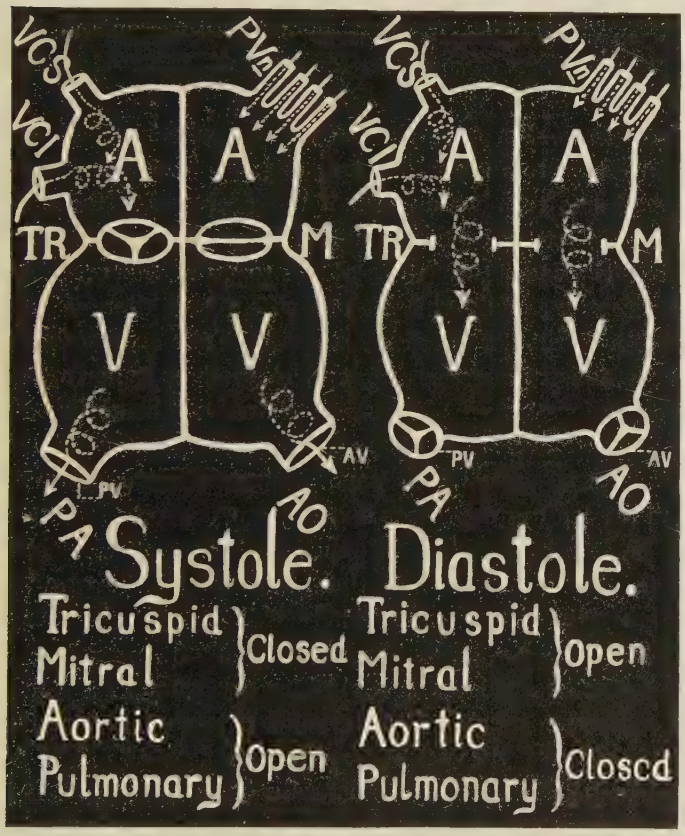


FIG. 34.—POSITION OF THE VALVES IN SYSTOLE AND DIASTOLE.

cuspid valves being open and the aortic and pulmonary valves closed, it must follow that conversely *any murmur immediately following, modifying or replacing the second sound* (diastolic) *is due to aortic or pulmonary leakage or to mitral or tricuspid obstruction.*

Nine out of ten murmurs have their origin in the left heart—the hard-working side.

Against the Stream.—It is at once evident that if at any point there exists an impediment to the free flow of the blood, an increased strain is thrown upon the cardiac mechanism and a tendency to congestion or stasis is at once established. Therefore, if any damming of the flow is present or any portion of the pumping machinery is defective the bad effects will appear chiefly in those portions of the heart nearer the venous sources of the blood. In short, if one may use an old expression, *the bad effects of a cardiac lesion work backward against the blood stream.*

Secondary effects of valvular lesions.

Interstitial nephritis.

Illustration.—For example, interstitial nephritis raises arterial blood pressure to an extraordinary degree. The left ventricle at once responds to the challenge of the narrowed arteries by increasing the strength of its contraction. The blood is then forced so vigorously into the aorta as to make the recoil of the aortic valve unusually violent, and as a result there is an "accentuation of the aortic second sound." Like every other muscle under unusual exercise, the ventricle tends to hypertrophy and to increase its strength; the wear and tear of the aortic valve is also increased, and an unusual and excessive pressure is exerted upon the mitral valve which stands between the overacting ventricle and the left auricle. If, as may happen, the mitral valve yields to the pressure, a backflow into the auricle is at once established, and the flow of blood from the lungs is at once obstructed. The right ventricle is immediately called upon for increased action in order to relieve the congestion of the lungs. The blood is then forced so strongly into the pulmonary artery as to intensify the shock of its valvular closure and produce an "accentuation of the pulmonary second sound." The lungs may thus be placed between two fires through the continued regurgitation of blood from the front and the increased pressure from the overacting right ventricle behind it.

Hypertrophy.

Secondary mitral leakage.

Pulmonary congestion.

Tricuspid leakage.

A persistence of these conditions would tend to cause a leakage through the tricuspid valve, and the effects of back pressure are then manifested in the general venous circulation by congestion and edema or general anasarca. Such a cycle of pathologic events is common enough in practice, and realizing what marked *local* symptoms may arise from even a slight chronic congestion of the brain, stomach, liver, intestines, kid-

neys, and lungs, one can readily understand how easily in such cases valvular disease *as a cause* may be overlooked.

RHYTHM.

Organic Murmurs Occurring with Systole.

(First sound) Ventricular Contraction. } Systole { Mitral regurgitation. Tricuspid regurgitation. Aortic stenosis. Pulmonary stenosis.

Such murmurs are nine times in ten due either to mitral regurgitation or aortic stenosis.

Murmurs Heard in Diastole.

(Second sound) Relaxation period. } Diastole { Aortic regurgitation. Pulmonary regurgitation. *Rarely* { Mitral stenosis. Tricuspid stenosis.

Such murmurs are almost invariably due to aortic regurgitation.

Murmurs Heard Immediately before the First Sound, Presystolic. (Auriculosystolic.)

Auricular contraction at end of diastolic period. } Presystolic { Mitral stenosis. Tricuspid stenosis.

A presystolic murmur is almost invariably due to mitral stenosis.

The Differential Points.—To differentiate heart murmurs the following points are determined:

(*a*) *Time or rhythm.*

(*b*) *Point of maximum clearness and intensity.*

(*c*) *The direction and extent of transmission.*

(*d*) *The quality of the abnormal sound.*

(*e*) *The associated signs: viz., arterial and venous pulsation, the radial pulse, increased area of cardiac dullness, accentuation of heart-sounds, cyanosis, edema, etc.*

To Determine the Rhythm or Time.—This should be positively determined by taking the carotid pulse while listening to the murmur. The radial pulse, being somewhat delayed, is an unsafe guide, especially in cases of very rapid heart.

Radial pulse an unsafe guide.

CHARACTERISTIC SYMPTOMS OF THE SYSTOLIC VALVULAR MURMURS.

MITRAL REGURGITATION.

Time.—Systolic.

Maximum Intensity.—At apex.

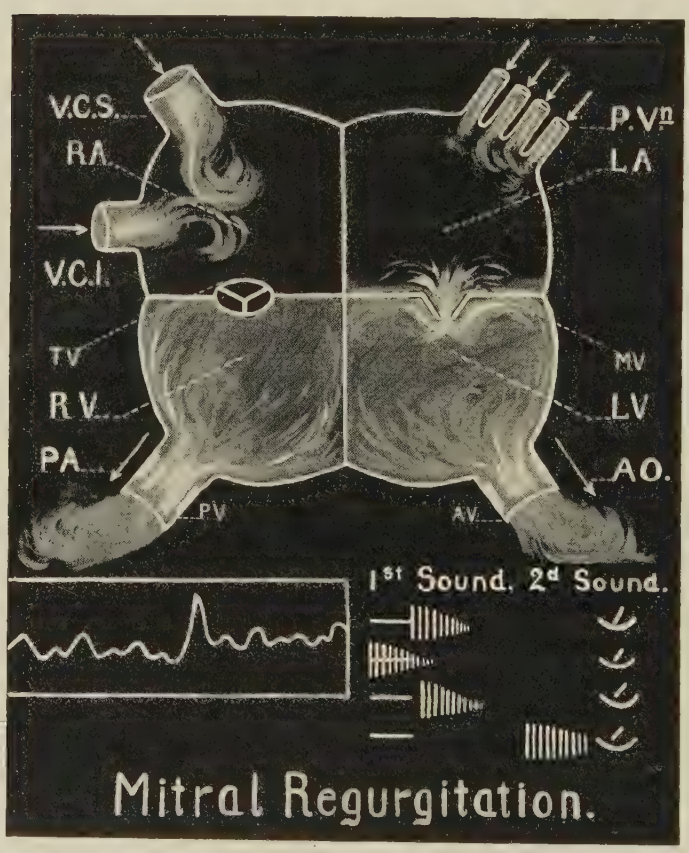


FIG. 35.—MITRAL REGURGITATION. Four varieties of the murmur of mitral regurgitation are shown graphically. The heart in systole, mitral leakage evident. The contracting ventricles are forcing the blood through the open aortic and pulmonary valves; the tricuspid, tightly closed, prevents regurgitation into right auricle. The leaky mitral allows backflow into the left auricle already filling from the pulmonary veins above.

Results.—A systolic murmur, dilatation of left auricle, pulmonary congestion, and consequent enlargement of right ventricle.

M V. Mitral valve. T V. Tricuspid valve. A V. Aortic valve. P V. Pulmonary valve. L A. Left auricle. R A. Right auricle. L V. Left ventricle. R V. Right ventricle. V. C. S. Vena cava superior. V. C. I. Vena cava inferior. P. Vn. Pulmonary veins. PA. Pulmonary artery. AO. Aorta.

Transmission.—To the left through the axillary space and just to the right of the edge of scapula between its spine and inferior angle.

Associated Signs.—Second sound accentuated in pulmonary

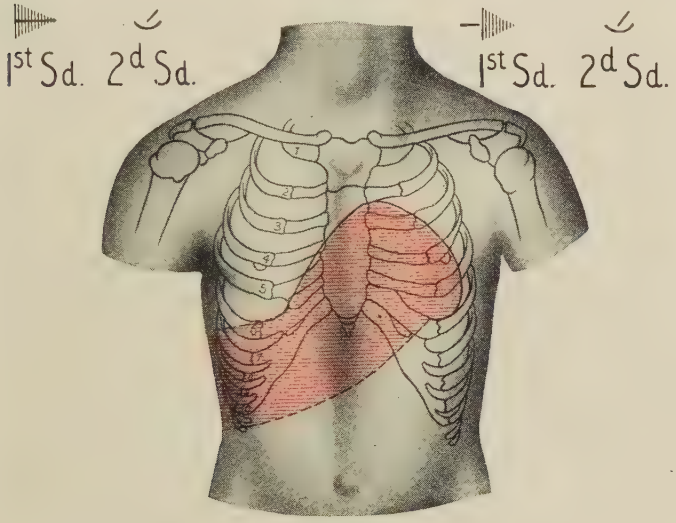


FIG. 36.—MITRAL REGURGITATION.
Percussion area (cardiac and hepatic).
(*Ward cases.*)

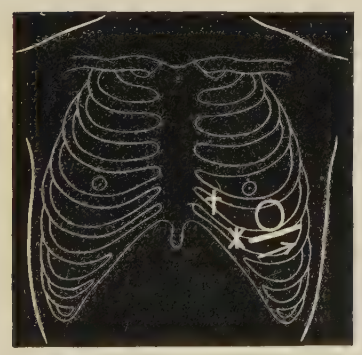


FIG. 37.—MITRAL REGURGITATION.—(*Sansom.*)
Maximum intensity and transmission.

area. Hypertrophy of right heart, and to a lesser degree of the left. *Apex displaced to left and slightly downward. Cardiac dullness is increased chiefly to the right;* the cardiac area is well shown in the accompanying diagram. (Fig. 36.)

Pulse usually irregular and of poor tension.* Cyanosis present to a variable degree. Pulmonary congestion. Edema.

AORTIC STENOSIS.

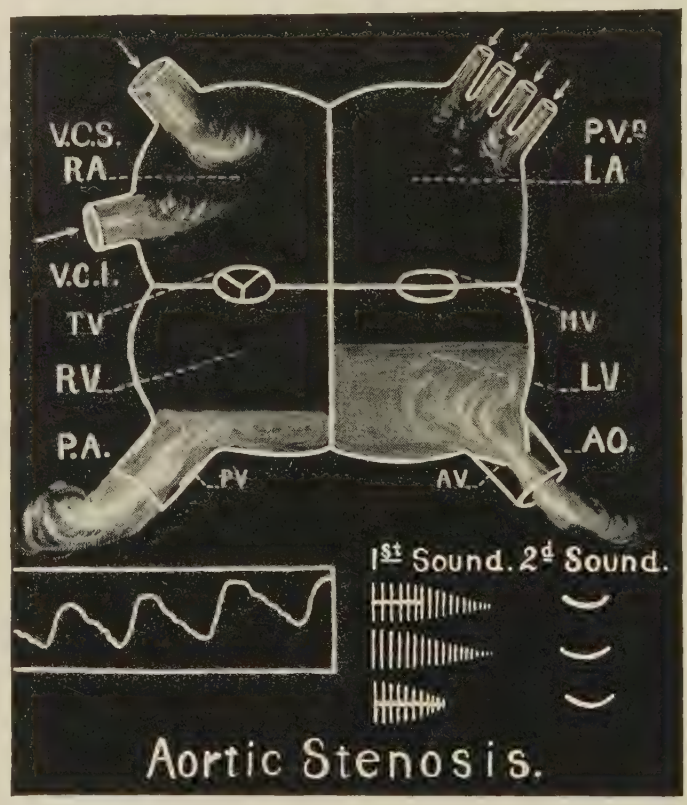


FIG. 38.—AORTIC STENOSIS.—A spygmographic tracing is shown, and three varieties of the aortic systolic murmur are represented graphically. Diagrammatic representation of the heart in systole, stenosis of the aortic valve being present; the mitral and tricuspid valves have closed; the right ventricle is nearly empty; the left ventricle is still more than half full of blood, because of the obstruction present at the aortic orifice.

Result.—A systolic murmur in the aortic area; enlargement of left ventricle, etc.

M V. Mitral valve. T V. Tricuspid valve. A V. Aortic valve. P V. Pulmonary valve. L A. Left auricle. R A. Right auricle. L V. Left ventricle. R V. Right ventricle. V. C. S. Vena cava superior. V. C. I. Vena cava inferior. P. Vn. Pulmonary veins. P. A. Pulmonary artery. AO. Aorta.

Time.—Systolic.

Quality.—Usually harsh and blowing.

* In well compensated lesions the pulse may be perfectly regular.

Maximum Intensity.—Right second intercostal space or over sternum at that level.

Transmission.—Upward into carotids and subclavians unless a

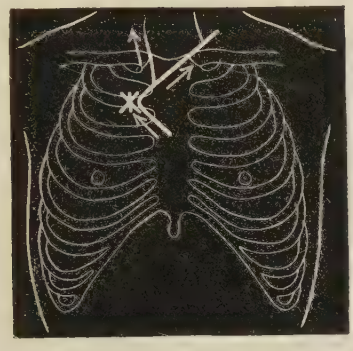


FIG. 39.—AORTIC STENOSIS.
Transmission.

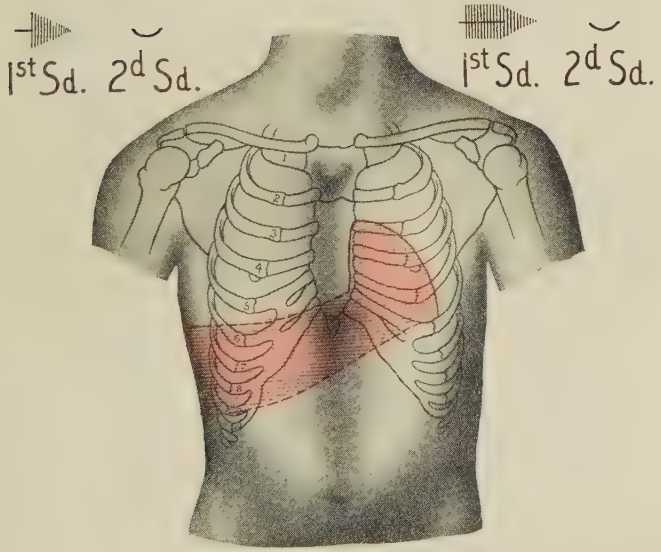


FIG. 40.—AORTIC STENOSIS.
Percussion area.
(*Ward cases.*)

very faint murmur. May, if intense, be heard over whole chest.

Associated Signs.—Hypertrophy or dilatation of the left ven-

tricle. Apex-beat markedly displaced *downward and to left.* Pulse usually deliberate, artery small and full between beats.

Second sound in aortic area relatively diminished.

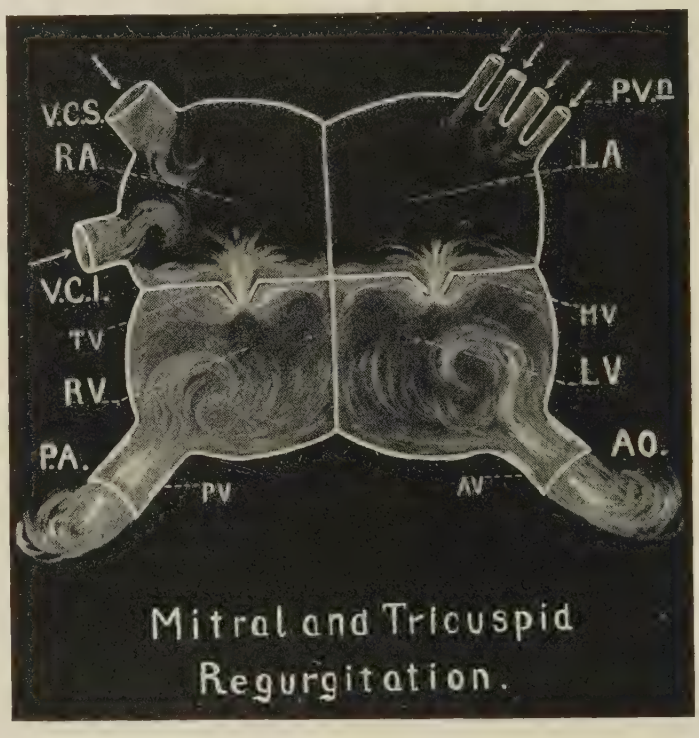


FIG. 41.—MITRAL AND TRICUSPID REGURGITATION.—Heart in systole. Mitral and tricuspid valves both incompetent.

Result.—Double systolic murmur, enlargement of both right and left chambers, pulsating jugulars, general venous congestion, edema, anasarca, etc.

M V. Mitral valve. T V. Tricuspid valve. A V. Aortic valve. P V. Pulmonary valve. L A. Left auricle. R A. Right auricle. L V. Left ventricle. R V. Right ventricle. V. C. S. Vena cava superior. V. C. I. Vena cava inferior. P. Vn. Pulmonary veins. P. A. Pulmonary Artery. A O. Aorta.

NOTE:—Dilatation of the right heart and tricuspid leakage are much more common than was formerly supposed.

TRICUSPID REGURGITATION.

Time.—Systolic.

Quality.—Blowing.

Maximum Intensity.—Left edge of sternum from third to sixth cartilages or over lower third of sternum.

Transmission.—May sometimes be heard over the whole right heart, and at times, if patient be recumbent, over the manubrium.

Associated Signs.—Hypertrophy or dilatation of right heart. Diminished accentuation of pulmonary second sound, distended or pulsating jugular veins. In bad cases or as the lesion advances it may, by back pressure through the general venous system, lead to chronic congestion of the liver, spleen, stomach,

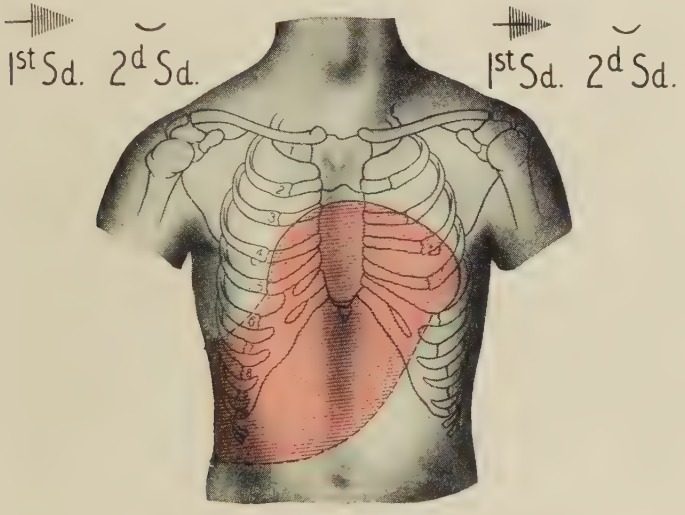


FIG. 42.—MITRAL AND TRICUSPID REGURGITATION.
Percussion area—cardiac and hepatic.
(*Ward cases.*)

and intestines, edema of the lower extremities or general anasarca. It is frequently secondary to a mitral lesion. (Figs. 41 and 42.)

PULMONARY STENOSIS.

Systolic murmurs in the pulmonary area are almost invariably functional. The organic murmur is extremely rare and usually congenital. If present, it is commonly associated with other congenital defects, such as a patent foramen ovale or perforate interventricular septum.

The differential diagnosis is at times extremely difficult, sometimes quite impossible.

The typical signs are the following:

Quality.—Rough, harsh murmur.

Time.—Systolic.

Maximum Intensity.—At second or third left interspace.

Transmission.—May be heard over whole right heart, but is usually markedly transmitted from pulmonary area upward and outward toward the clavicle. It is *not* transmitted along the aorta and into the carotids.

Not likely to be encountered by examiners.

Associated Signs. — Diminished pulmonary second sound. Hypertrophy of right heart. Cyanosis is easily produced by cough or exertion, and may be permanent. It will certainly be

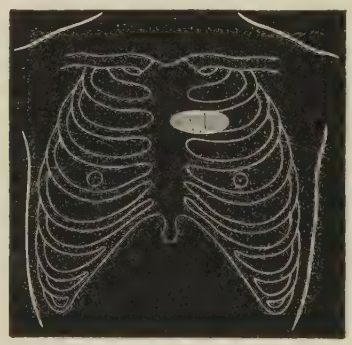


FIG. 43.—PULMONARY STENOSIS IN ADULTS.—(*Sansom.*)
Shaded area represents field of maximum intensity.

FIG. 44.—PULMONARY STENOSIS.
*. Maximum point and direction of transmission.

so if a patent foramen ovale coexist with the pulmonary stenosis. Its victims usually die young of pulmonary tuberculosis, and the insurance examiner is not likely to meet with it.

THE CHARACTERISTIC SYMPTOMS OF THE DIASTOLIC VALVULAR MURMURS.

The diastolic valvular murmurs are, theoretically, *mitral stenosis*, *aortic regurgitation*, *tricuspid stenosis*, and *pulmonary regurgitation.*

An exception must be made in the case of stenosis of the mitral or tricuspid orifices. Such murmurs are rarely diastolic, possibly because the flow of blood from auricle to ventricle during

diastole is not sufficiently forcible to produce a murmur until just before systole, when the ventricular suction is reinforced by auricular contraction. For this reason the rhythm of mitral or tricuspid murmurs due to stenosis is presystolic or auriculosystolic—*i. e.*, beginning late in the diastolic period,

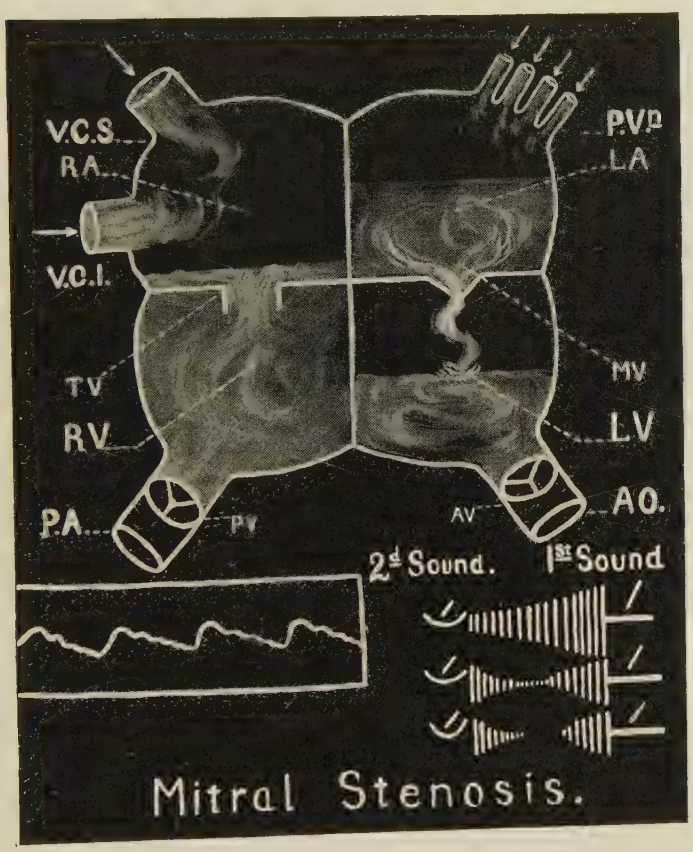


FIG. 45.—GRAPHIC REPRESENTATION OF THREE VARIETIES OF THE MURMUR OF MITRAL OBSTRUCTION. (With Sphygmogram.)

Heart at moment of auricular contraction immediately before systole (presystole); mitral obstruction evident; aortic and pulmonary valves closed; tricuspid freely open; *right* auricle nearly empty; right ventricle filled; *left auricle but partly emptied; left ventricle barely half full.*

Result.—Presystolic or diastolic murmur, dilatation of left auricle, congestion of lungs, consecutive enlargement of right heart.

M V. Mitral valve. T V. Tricuspid valve. A V. Aortic valve. P V. Pulmonary valve. L A. Left auricle. R A. Right auricle. L V. Left ventricle. R V. Right ventricle. V. C. S. Vena cava superior. V. C. I. Vena cava inferior. P. Vn. Pulmonary veins. P. A. Pulmonary Artery. A O. Aorta.

they are heard just before and cease abruptly at the first sound.

MITRAL STENOSIS.

Quality.—Harsh, vibratory, or blubbering murmur *terminating abruptly* in marked crescendo.

Time.—Presystolic. Increasing in intensity as it runs into a sharply accentuated first sound. Rarely diastolic. Still more rarely divided.

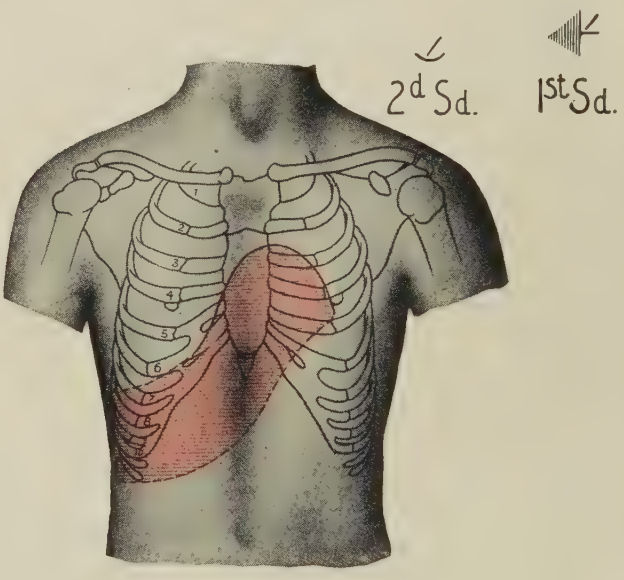


FIG. 46.—MITRAL STENOSIS.
Percussion area.
(*Ward cases.*)

Point of Maximum Intensity.—At or just to the right of the apex-beat.

Transmission.—Limited to mitral area. Usually very sharply defined.

Associated Signs.—Cyanosis present to some degree. Accentuated pulmonary second sound. Is frequently accompanied by a systolic mitral murmur (regurgitation). Marked hypertrophy of right ventricle. Percussion dullness extends to right of normal boundaries. Pulse small, rapid, and irregular. *Thrill* felt best at or near point of maximum intensity of murmur. A diagnosis

may often be made by palpation, a presystolic thrill in the mitral area being pathognomonic of mitral stenosis. Second sound frequently doubled.

Sources of Error.—The diastolic murmur of mitral stenosis may be confounded with a rare form of aortic regurgitant murmur that is distinctly heard at the apex.

The presystolic murmur is often variable or intermittent, may be heard only in either the standing or recumbent position, and may be entirely obliterated by pressing too heavily with the bell of the stethoscope.

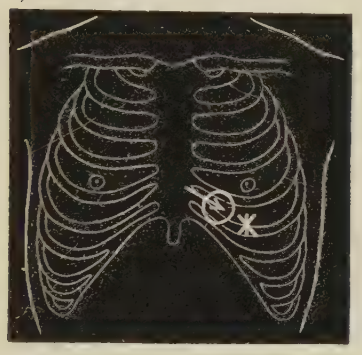


FIG. 47.—MITRAL STENOSIS.—(*Sansom-Bramwell.*)

*. Point of maximum intensity and transmission.

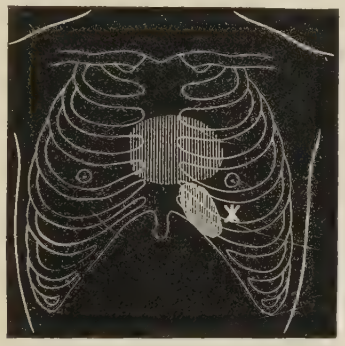


FIG. 48.—MITRAL STENOSIS.—(*Sansom.*)

Upper shading, Area of audibility of simulated doubling of second sound. *Lower shading*, Area of murmur transmission.

The sharp flapping first sound is usually so strikingly characteristic as to suggest the presence of mitral stenosis even when no murmur is present.

AORTIC REGURGITATION.

Quality.—A blowing murmur of variable pitch and intensity, usually somewhat prolonged, occasionally very short, may be musical.

Time.—Diastolic. Commencing with or immediately following the second sound.

Maximum Intensity.—At aortic area (second right interspace), third left interspace, or at ensiform. Is increased by raising the

arms to a vertical position. Very rarely this murmur is heard only at the apex.

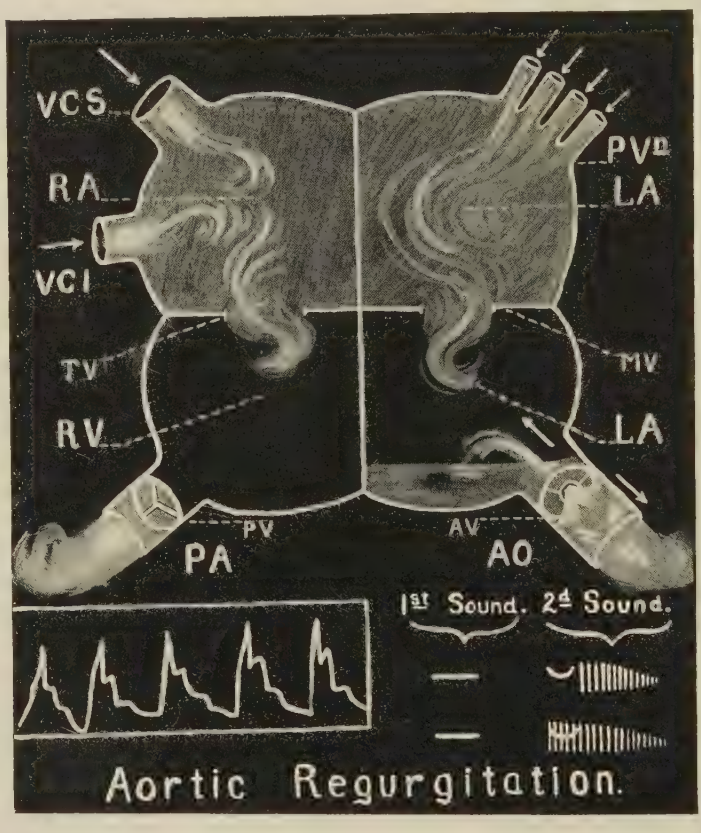


FIG. 49.—GRAPHIC REPRESENTATION OF MURMUR. TWO VARIETIES OF AORTIC DIASTOLIC MURMUR SHOWN GRAPHICALLY. (With Sphygmogram.)

The heart is shown in diastole, aortic leakage being evident. The blood has just been projected into the aorta and pulmonary artery by the ventricular contraction. The pulmonary valve tightly closed maintains the blood column, but through the leaky aortic valve a regurgitant current meets the stream descending from above through the open mitral valve.

Results.—A diastolic murmur, dilatation and hypertrophy of left ventricle, a slapping, low-tension pulse.

M V. Mitral valve. T V. Tricuspid valve. A V. Aortic valve. P V. Pulmonary valve. L A. Left auricle. R A. Right auricle. L A. Left ventricle. R V. Right ventricle. V C S. Vena cava superior. V C I. Vena cava inferior. P Vn. Pulmonary veins. P A. Pulmonary artery. A O. Aorta.

Transmission.—Along lines shown in figure 52—*i. e.*, from second right interspace to second left or third left cartilage,

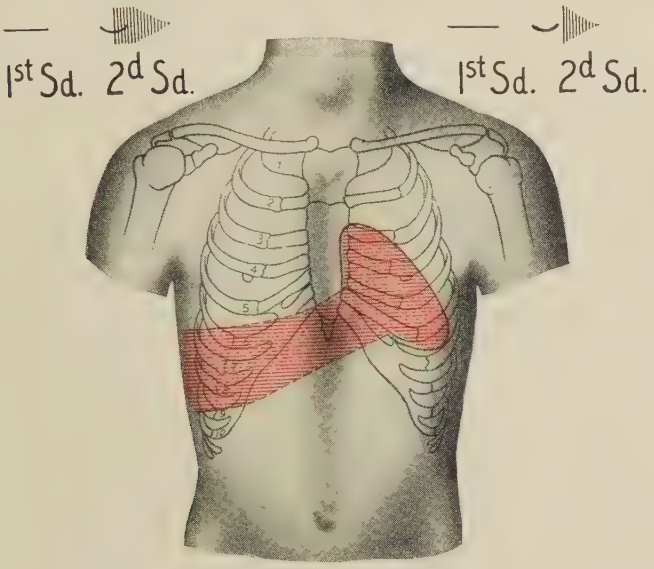


FIG. 50.—AORTIC REGURGITATION.
Percussion area.
(*From ward cases.*)

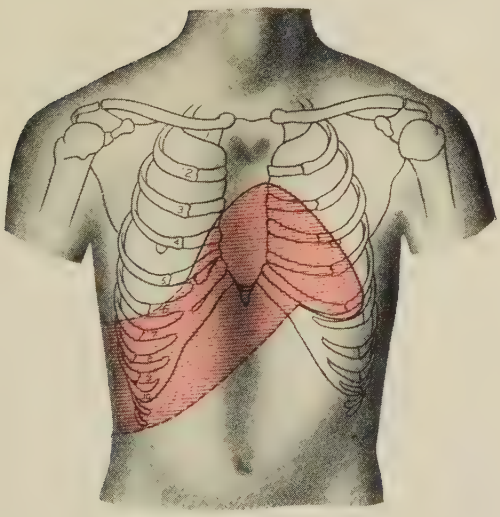


FIG. 51.—AORTIC AND MITRAL REGURGITATION.
Percussion area.
(*Ward cases.*)

down left edge of sternum; is frequently heard at apex and in the carotids.

Associated Signs.—Pallor, visible jerking pulsation of peripheral vessels—*i. e.*, temporal, carotid, subclavian, axillary, brachial, radial, etc. Second sound lost in carotids. "Pistol-shot" sound in femorals. Pseudomitral stenosis (Flint) murmur.

Capillary Pulse.—If the nails be examined closely, or if a glass slide be pressed upon the lips, or if the skin be reddened by friction, a rhythmic flush may be seen.

Radial Pulse.—A jerking, throbbing, slapping pulse. (The "Corrigan" or "water-hammer" pulse.) In shaking hands, the pulse may be felt, or in grasping the tips of the fingers or toes.

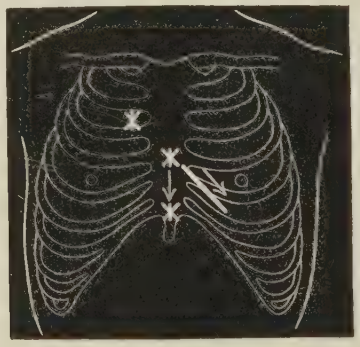


FIG. 52.—AORTIC REGURGITATION.—(*Sansom-Bramwell.*)
*, *, *. Maximum intensity and directions of transmission.

In order to best appreciate the lack of sustained tension, it is well to raise the arm and grasp the wrist with the hand in such a way that the ball of the examiner's thumb overlies the radial artery, the finger and thumb meeting on the back of the hand.

Cardiac Area.—The cardiac area is increased downward and to the left because of left ventricular hypertrophy. (See Fig. 50.)

Pistol-shot Sound in Femorals.—This curious sound may be heard in the femoral arteries in well-marked cases. Dizziness, fainting, palpitation, cardiac pain, and neurasthenic symptoms are common in this lesion. The ophthalmoscope may show jerking retinal arteries. The second aortic sound is markedly diminished and usually lost in carotids. Aortic regurgitation is frequently associated with aortic stenosis.

TRICUSPID STENOSIS.

Rare, usually congenital.

Quality and Time.—Exactly like mitral stenosis.

Point of Maximum Intensity.—Lower sternum, chiefly along right border.

Transmission.—Slight along right sternal border.

Associated Signs.—Marked cyanosis. Distention of jugulars.

Percussion Area.—That of right auricular dilatation.

PULMONARY REGURGITATION.

Rare, usually congenital.

Quality and Time.—Exactly like murmur of aortic regurgitation.

Point of Maximum Intensity.—Second left interspace.

Transmission.—Over sternum and down its left edge. Differentiated from aortic regurgitation by the *percussion area*, which is that of a hypertrophied *right* ventricle, and by the—

Associated Signs.—These are cyanosis and overdistention of jugulars. In this lesion the second aortic sound is clearly heard. The marked jerky pulsation of peripheral arteries and "Corrigan pulse" are lacking. The capillary pulse is wanting.

Of little importance to examiner.

Rarer Murmurs.—As a matter of fact, the organic pulmonary murmurs and that of tricuspid stenosis are so rare in adults as to be practically out of the Insurance Examiner's field, and he has only to consider mitral, tricuspid, and aortic regurgitation, and mitral and aortic stenosis.

"Diagnostic tips."

Roughly speaking, a systolic murmur is due nine times out of ten to mitral regurgitation or aortic stenosis, and as one is heard best at the apex and transmitted to the axilla and back, and the other is best heard at the aortic cartilage and transmitted upward, no confusion need occur. A purely diastolic murmur is almost certainly due to aortic regurgitation, and its peculiar transmission and the associated signs make it quite unmistakable.

The chief source of error lies in a failure to take the time of every murmur by the *carotid* beat.

Timing the murmur.

Associated Murmurs.—Any combination of murmurs may be encountered, though in most instances a postmortem greatly reduces the excessive number sometimes reported.

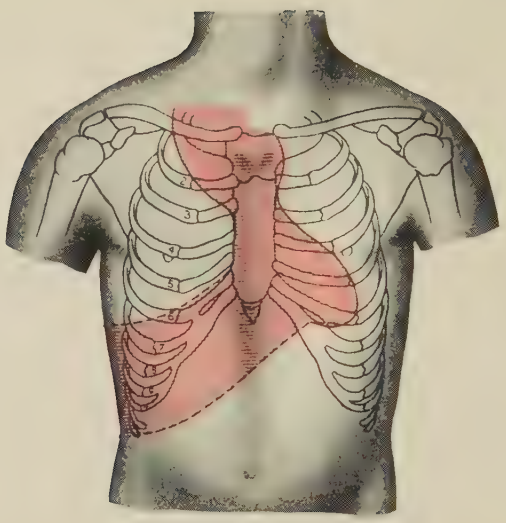


FIG. 53.—ANEURYSM OF THE AORTA.
Percussion area.

FIG. 54.—AORTIC ANEURYSM (ASCENDING PORTION OF ARCH).
Unusual percussion area. +. Only point of pulsation. Had taken out insurance within two years.

Differentiation of Murmurs.—The chief means of differentiation of coexisting murmurs are the following:

Determination of Difference in Quality.—One may be blowing, another rolling, etc.

Differences in Pitch.—A most valuable means of distinguishing murmurs of the same time and quality.

Shape of the Cardiac Area.

Points of Maximum Intensity.—As shown in foregoing description.

Transmission.

Analysis of Associated Signs.

ANEURYSM.

Rarely detected.

Very few cases of aneurysm are detected by medical examiners, and the reason is no doubt to be found in the fact that too little attention is paid to the region of the aortic arch. It should be remembered that men are seldom aware that they have an aneurysm until it has assumed large proportions and has become easily recognizable.

Symptoms.—The symptoms are, on inspection, visible pulsation of a heaving, expansile character; in rarer instances a visible pulsating tumor. Palpation confirms the presence of pulsation or swelling, determines its expansile character, and frequently detects a systolic thrill, and a curious sensation of recoil coincident with the second sound and known as diastolic shock. Pressure symptoms may be marked and of the most diverse description. Pain, palpitation, and breathlessness are often present.

The Pressure Symptoms of Aneurysm.—

Pressure on esophagus,	Difficulty in swallowing.
" " trachea,	Cough, dyspnea, stridor, and hemoptysis
" " recurrent laryngeal,	Hoarseness, aphonia, paralysis or spasm of left vocal cord, brazen cough.
" " the phrenic,	Hiccup, paralysis of diaphragm.
" " " vagus,	Nausea, vomiting, or dyspepsia.
" " " superior vena cava,	Edema of upper extremities, engorged superficial veins, cyanosis.
" " " sympathetic,	Dilatation or contraction of pupil, localized flushing, sweating, or pallor.
" " " pulmonary artery,	Production of a systolic pulmonary murmur and dilatation of the right heart.
" " " root of lung,	Symptoms of phthisis. A common source of error in diagnosis.
" " " cardiac plexus,	Angina.
" " " left innominate vein,	Edema of left upper extremity.
" " thoracic duct,	Marasmus.

Percussion reveals an area of marked dullness over or near the manubrium of the sternum or along its right edge. The heart area usually but not always gives evidence of an enlarged left ventricle.

Pulse.—The pulse may or may not be affected. Frequently there is a marked difference between the right and left radial carotid and subclavian pulsation. Such differences often give material assistance in the determination of the portion of the aortic arch that is affected.

FIG. 55.—AORTIC ANEURYSM.
Same case as figure 54, three months later.

Auscultation.—Aneurysms of the aorta are usually attended by systolic murmurs of variable intensity, heard best over the aneurysm itself, and transmitted into the vessels beyond. The heart-sounds are peculiarly loud and ringing, this being especially true of the second sound. In aneurysms that spring from the ascending portion of the arch there is frequently an associated diastolic murmur, due to insufficiency of the aortic valves.

Pain.—This is one of the most prominent symptoms of aneurysm, but is apt to be regarded as rheumatic or neuralgic both by the examiner and the applicant. All cases in which pain has been experienced about the upper chest should strongly suggest aneurysm.

Tracheal Tugging.—In aneurysm involving the transverse portion of the aortic arch the symptom known as tracheal tugging may often be elicited.

FIG. 56.—AORTIC REGURGITATION.
Aneurysmal dilatation. Mitral leakage.

Method.—The person under examination should be erect, with mouth closed and chin well elevated.

The examiner grasps the cricoid cartilage between thumb and forefinger and makes steady upward pressure, when, if aneurysm be present, a transmitted aortic pulsation may be distinctly felt.

DIAGNOSTIC ERRORS THAT MAY BE WHOLLY EXCUSABLE.

It is undoubtedly true that in many instances the medical examiner is unjustly censured for having failed to detect a heart murmur perfectly apparent to another person on a different occasion. Because of their notorious variability, the most expert clinician can not fail at times to overlook certain valvular lesions. One of the most marked examples is afforded by mitral stenosis, the most characteristic and well-marked of all heart murmurs. Frequently such a murmur will entirely disappear, or, as has been previously stated, will be found only when the patient is placed in a certain posture or makes some physical exertion. The same may be said of its tendency to disappear if pressure with the stethoscope be too great. Aortic regurgitation affords another example of a murmur usually well marked and characteristic, but at times entirely absent, and only to be recognized by its associated signs.

THE EXAMINATION OF THE CHEST (Continued).

THE LUNGS.

INSPECTION.

General surface indications.

The examiner takes in at a glance the general shape of the chest, muscular development, the presence of fat, the symmetry of the two sides, any local bulging or retraction, the presence of scars, skin eruptions, or abnormal growths of any sort, the position, character, and extent of the apex-beat, and seeks carefully for any evidence of abnormal pulsation in the carotids or subclavians, or over and near the manubrium sterni.

Figures 57 to 63 inclusive should be studied in connection with the physical signs of disease of the lungs.

The Form of the Chest.

The general appearance of the normal chest is too well understood to require an extended description. It should be reasonably

THE CHEST IN CROSS-SECTION.

(*After Braune.*)

FIG. 57.—NORMAL CHEST.

This figure shows the conditions affecting percussion of the normal chest. (*a*) Variation in shape and volume of the two lungs. (*b*) Modified resonance due to ribs and sternum overlying pulmonary tissue. (*c*) The uselessness of percussion near the spinous processes of the vertebral column.

FIG. 58.—EMPHYSEMA.

The distended air-cells and voluminous lungs are clearly shown.

THE CHEST IN CROSS-SECTION.—(*Continued.*)

FIG. 59.—MALIGNANT GROWTH (LEFT) AND PULMONARY ABSCESS (RIGHT).
The larger mass on the left side involves a bronchus, and would yield signs of consolidation. The anterior superficial mass would present only dullness, diminished voice and breath sounds, with defective lung movement on affected side. Such abscesses as are here shown present few recognizable *physical* signs, and are often overlooked.

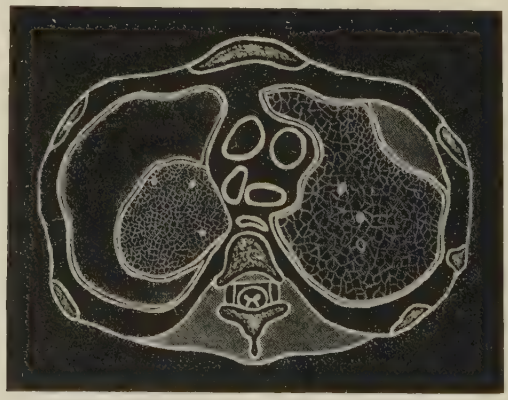


FIG. 60.—PNEUMOTHORAX (LEFT) AND ENCAPSULATED FLUID (RIGHT).

THE CHEST IN CROSS-SECTION.—(*Continued.*)

FIG. 61.—PLEURAL EFFUSION.

Especial attention should be directed to the compressed lung in the larger effusion.

FIG. 62.—LOBAR PNEUMONIA (LEFT); CENTRAL PNEUMONIA (RIGHT).

The lobar consolidation on the right side would present the classical signs of complete solidification with patent bronchi.

The central area of consolidation would yield no percussion signs, and be chiefly denoted by distant tubular breathing obscured by the vesicular murmur of overlying lung-cells.

symmetrical, although there is invariably a slight difference between the two sides, the right or left side being slightly larger than its fellow, corresponding to the right- or left-handedness of its

THE CHEST IN CROSS-SECTION.—(*Continued.*)

FIG. 63.—VARIOUS FORMS OF PULMONARY CAVITIES; INCIPIENT TUBERCULAR DEPOSITS; AREA OF SOFTENING (RIGHT INFERIOR).

owner. The following summary will serve to indicate the most important variations from the normal form :

	Cause.	*Characteristics.*
Bilateral enlargement.	Emphysema, or the chest of inspiration.	Barrel-shaped chest. Vertical movement. Wide costal angle. Arched spine.
Unilateral enlargement.	Pneumothorax. Tumors. Effusion. Congenital heart or heart disease in youth.	
Unilateral shrinking.	Pleuritic adhesions. Cirrhosis. Collapse. Cancer.	
General deformities, chiefly congenital.		Rachitic chest. Transversely constricted chest. Flattened chest. Pigeon-breast. Trichte brust (funnel breast).

CHEST OUTLINES.

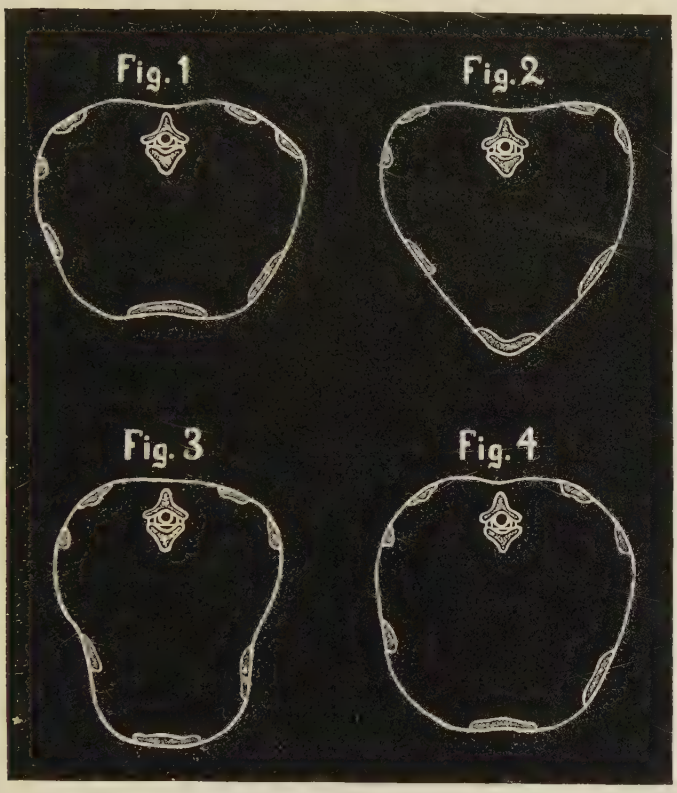


FIG. 64.—Fig. 1. Normal chest. Fig. 2. Pigeon breast. Fig. 3. Rickets. Fig. 4. Emphysema.—(*Gee; modified.*)

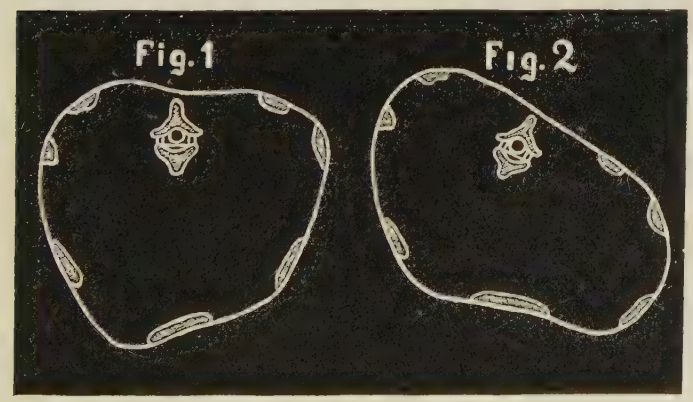


FIG. 65.—Fig. 1. Unilateral Retraction. Fig. 2. Spinal Curvature. —(*Gee; modified.*)

Barrel chest.

Emphysema.—The *barrel-shaped chest* is by no means invariably present in this disease, nor does it always follow that a barrel chest covers an emphysematous lung. It *suggests* asthma or emphysema, and demands a careful determination of the position and respiratory excursion of the lower border of the lungs and of the area of the superficial dullness of the heart. On the other hand, there is a tendency to overlook or fail to recognize a chest of the emphysematous type, because of the tendency of the spine to adapt itself to the changed diameters by a compensatory curve. In such a case, the typical emphysematous form is apparent only after the patient has been placed on a flat surface in the dorsal recumbent position.

Exceptions to rule.

Posture.

Alar chest.

The long, narrow or flattened chest, with projecting, wing-like scapulæ, narrow epigastric angle, drooping shoulders, and long, prominent neck, indicates a predisposition to phthisis, and calls for careful scrutiny of the lungs; and especially is this the case if the family history shows any tuberculosis in the members.

Pseudoalar Chest.—Every thin chest is not a phthisical chest, and it should be remembered that a thorax approaching the alar type does not necessarily prove its possessor to be a victim of tuberculosis. As in the case of the barrel chest, the form merely *suggests* the presence of a morbid condition and the need of an especially critical examination.

As regards the *rachitic chest*, the *transversely constricted chest*, *pigeon-breast*, etc., it need only be said that they probably all represent a failure in the early nutrition of the individual, combined with some chronic obstruction to free breathing. The *transversely constricted chest* comes under the same general description, and is seen in association with adenoid disease or other forms of nasal obstruction, even though the general nutrition of the child be but little affected.

Trichte Brust.—This condition may be congenital or acquired, and is characterized by a funnel-shaped depression of the lower and median aspect of the chest.

Importance in prognosis.

It is quite possible for a person to enjoy reasonably good health in adult life in spite of these chest deformities. At the same time, it must be admitted that, as a rule, they coincide with a somewhat enfeebled constitution and a predisposition to disease of the lungs. Retraction of one side or local retraction in any

area suggests fibroid lung, old pleurisy, or present or past tuberculosis.

Hollows in the suprascapular region should suggest possible retraction of the apices, and call for careful determination of their upper borders and of their relative mobility. Such hollows lose much of their significance if they are bilateral and equal. Inequality of the two sides of the chest may indicate some previous disease of lung or pleura, but may also point to a lateral curvature of the spine which, if slight, is of no importance from an insurance standpoint.

Unilateral *vs.* bilateral retraction.

The presence of scars may be of great assistance. The curious S-shaped or circular scars of syphilis may be seen upon the back. The short linear scars of a remote cupping may be noticed over the heart or lung, and point to past pericarditis or pleurisy. To these may be added the tell-tale scar due to thoracotomy. Scars in the cervical triangle suggest a past glandular inflammation, usually tuberculous in character. One may also see *active* eruptions of various kinds, and perchance may find in them evidence of syphilis.

Scars.

One of the lesions commonly overlooked is thoracic aneurysm, and any abnormal pulsation must be carefully investigated.

Aneurysmal pulsation.

Local bulging in the cardiac area affords evidence of heart disease in childhood, and often enables one to set the date of some long-established valvular lesion.

Precordial bulging.

Apical Retraction.—It will do no harm to repeat the statement that a symmetrical retraction at the apices in the absence of physical signs is of little importance. Such a condition is surprisingly frequent even in women, their breathing being rather more superior costal than apical in type. In the author's opinion, the most frequent cause of bilateral hollowing is the presence of nasal obstruction or tonsillar hypertrophy, he having had frequent occasion to note its disappearance after operative procedure.

Life Insurance Requirements.—(See Measurements.)

Chest Movements.—Reference is made to this subject elsewhere, and it is only necessary to remind the reader that in men abdominal breathing predominates, in women costal breathing, and that any reversal of the rule is especially important.

Counting the Respiration.—All insurance companies ask for

Usually a farce.

the rate of respiration, and it is to be feared that they usually get a figure that is not based upon an actual count. It is, in fact, extremely difficult to make a satisfactory record during an insurance examination—absolutely impossible if the applicant knows that anything of the sort is being done. The count is therefore to be made while the examiner is ostensibly engaged in taking the pulse, during which procedure he can keep the "tail of his eye" upon the movement of the chest. The author can not help but feel that the same amount of time might better be employed in testing the knee-jerks or taking the temperature, matters omitted from the average examination blank.

Dyspnea and Cyanosis.—These subjects are quite fully dealt with in another section.

The Diaphragm Phenomenon of Litten.—This test, while not included in the ordinary examination for insurance, may be

Value.

of considerable value in cases where doubt arises as to the mobility of the lower border of the lungs. It consists of a shadow that in inspiration moves downward from the sixth rib in the space between the mammillary and midaxillary line, and disappears as it approaches the costal margin.

Normal range.

It should have a range of movement of two or more inches in the normal chest, and is particularly valuable as indicating differences in the mobilily of the two lungs. It corresponds to the separation of the pleural fold coincident with the descent of the diaphragm and inferior border of the lung. To elicit the sign, the patient should be placed upon the back, the shoulders somewhat elevated, with the feet toward the source of light. The observer should stand with his back to the light, five or six feet away, opposite the applicant's or patient's knees. The light should come from one window only, and be not too intense.

Diagnostic importance.

It is readily seen in nearly all normal chests—in all, certainly, that are not thickly covered by fat. It is lost in pleural adhesion or effusion, in pneumonia of the lower lobe, or tumors occupying the lower chest, greatly diminished in range in tuberculosis, even of the apex, and in emphysema. On the other hand, tumors or fluid below the diaphragm do not entirely obliterate it. It was at first supposed that it might serve as a differential point in the diagnosis of subdiaphragmatic abscess, but has not borne out its early promise.

PALPATION.

Special and general application.

Palpation as applied to intrathoracic disease has chiefly to do with the detection of fremitus, pulsation, and lung expansion, but here as elsewhere is of importance in its broader application. By touch one determines the form, consistence, extent, mobility, and sensitiveness of morbid growths, the nature of swellings, the presence of abnormal heat, the location of painful areas, the presence or absence of moisture, and the quality and elasticity of the skin.

Respiratory Movements.—In this connection palpation confirms, corrects, and amplifies the result of inspection. Expansion should, of course, be uniform and equal, and the examiner should carefully note—

1. Increased or diminished movement.
2. Retarded movement in inspiration.
3. Retarded recession in expiration.

Technic and special devices.

In this procedure the hands are placed fairly upon the chest, palm down. The applicant should be sitting in a chair facing the light. The examiner should be behind him, viewing the chest tangentially. Both by sight and feeling he should note the movement of the chest during deep breathing. It is useful at times to place between the fingers two pencils, toothpicks, or matches, the extent of movement being made very noticeable by the rise and fall of the perpendiculars thus erected. For the upper lobe it is well to place the thumbs in the supraclavicular space and the fingers in the infraclavicular region.

General lack of expansion may be due to deficient lung capacity, to emphysema, to a rigid chest-wall, *or to a lack of skill on the part of the applicant.* Many persons can not breathe or cough to order. Some, indeed, do not know how to expand their lungs. In another chapter attention is directed to the fact that athletes and consumptives often show the greatest expansion, the former because of lung capacity, great muscular strength, and special training, the latter because of the common employment of forced breathing as a therapeutic measure.

Paradoxic expansion.

Unilateral defects of expansion are important, for a one-sided deficiency indicates a crippled lung, be the cause what it may. As before stated, a failure of expansion in the upper chest of

women, even if it be bilateral, is very suggestive, for costal breathing is the feminine type, and a lack of it should always lead one to examine both apices with especial care. On the other hand, superior costal breathing in men should lead one to critically examine the bases. Any lack of the normal inspiratory fullness in the epigastrium such as is seen in diaphragmatic paralysis and painful abdominal affections should be noted. The man with a painful growth of a movable subdiaphragmatic organ is exceedingly apt to use costal breathing instead of the masculine type. In the detection of tender areas the expression of the face is the safest guide.

Reversal of sex type.

Detection of tender areas.

Pleural friction and coarse râles may be palpable.

Vocal Fremitus.—Vocal fremitus, or the vibration of the chest caused by the production of sounds, is best detected by simultaneously placing the ulnar surfaces of both hands upon each side of the chest at corresponding points. The patient is then asked to enunciate clearly the word "nine" or "ninety-nine," the resultant vibration of the chest under the hands being noted, and that of one side carefully compared with the other.

Technic.

It is a useful procedure to alternately raise and lower the palpating hands, thus rendering the contrast in fremitus more distinct, or even to use the same hand, applying it first to one side and then to the other. There is normally a perceptible difference between the right and left side, that of the right being the stronger. A *marked* difference is always a suspicious sign, especially so if the fremitus of the left exceeds that of the right side, and even an equality of fremitus should suggest a special examination of the left apex. Vocal fremitus conforms to the laws of sound conduction. It follows therefore—

Significance of increased fremitus on left side.

Simple laws of conduction.

1. That if bronchial communication exist, the louder and deeper the voice, the greater is the fremitus.

2. The denser the conducting material, the greater the fremitus—e. g., *consolidated lung yields increased fremitus, provided that it is in contact with or surrounds a patent bronchus.*

3. The transmission of the sound through a tube and into an air-chamber causes conservation and reinforcement of the sound-waves, and thus increases fremitus—e. g., *cavity communicating with a bronchus causes increased fremitus.*

4. The more homogeneous the conducting medium, the greater is the intensity of vibration.

5. The interposition of substances of a different molecular structure between the conducting body and the hand acts as a damper and interrupts the conduction of vibration—e. g., *absence of fremitus in extensive pleural effusion, liquid or gaseous or diminished fremitus in pleural adhesions. This may also be due, in a measure, to the relaxed condition of the lung.*

Using the ulnar surface of the hand.

The author is aware that the technic here recommended is not that in general use, but personal experience has convinced him that the use of the ulnar surface of the hand is more satisfactory than the employment of the palmar surface.

The following points are to be borne in mind:

Significance of abnormal fremitus.

(*a*) *Markedly increased fremitus points to consolidation of lung tissue or cavity formation.*

(*b*) *Markedly diminished fremitus indicates emphysema, pleural adhesions, pleural effusions, pulmonary edema, obstructed bronchus, etc.*

It must not be forgotten that the strength and pitch of the voice and the presence of fat and muscle modify fremitus. Also that bilateral increase or decrease in corresponding chest areas is, as a rule, of comparatively slight significance.

PERCUSSION.

General Considerations.—It matters little what the examiner uses as a pleximeter provided he adheres to one method, but the finger can be used in nearly every case, and has one great advantage over an artificial pleximeter in the fact that it can not be lost or left behind.

The finger the best pleximeter.

The percussion stroke is best made with the middle finger, and should be given with a loose wrist in exactly the same manner as in striking a single staccato note on a piano. Certain matters are very important:

Technic.

(*a*) The stroke should be equally strong on both sides.

(*b*) Exactly the same area on each side should be alternately percussed.

(*c*) No change in position that involves muscular action upon one side should be permitted.

(*d*) *The attention should be so concentrated* upon the tone

elicited as to render unnecessary a prolonged tapping of the same region and resultant loss of time.

(*e*) The force of the stroke should be determined by the nature of the underlying structures.

Strong percussion is useful when the chest-wall is very fat or muscular, or when one wishes to detect some nonresonant body lying beneath one that is resonant.

Light percussion is more generally useful, and especially so when one has to deal with a thin wall or with a nonresonant body overlying a resonant one.

Position of the Applicant.—During the percussion of the anterior surface the hands should hang loosely at the side. When the axilla is reached, the hands should be placed upon the head, and percussion of the posterior surface should be carried out when the arms are *lightly* folded in front, *not placed upon opposite* shoulders, as is sometimes advised. The latter position necessarily involves muscular tension that interferes with the elicitation of the true note. In auscultation, however, this position is useful in determining the condition of the interlobar region.

Relax the muscles.

The Normal Notes.—It is important that the normal variations peculiar to different areas of the chest should be held clearly in mind, and these standard notes can be learned only by painstaking practice upon a sound chest.

Practice on the normal chest.

The *apices* yield normally a resonant note, clear but not intense, and tending to rise in pitch as the pleximeter finger approaches the median line.

The *infraclavicular space* is typically resonant, and the pitch of the percussion note is slightly higher upon the right than upon the left side. Any tendency to approach the region of the primary bronchus results in a note of heightened pitch, increased resistance, and shortened duration.

Below the right second rib anteriorly there is increased resonance until the fifth rib is reached, when the pitch rises because of the underlying solid tissue of the liver. At the sixth rib resonance ceases, and absolute dullness marks the lower limit of the lung and the upper border of the uncovered surface of the liver.

In the axillary region, typical pulmonary resonance persists until the eighth rib is reached.

The cardiac area markedly modifies the percussion note of the left chest anteriorly from the lower border of the third rib downward within the nipple line.

Traube's space and the splenic area have already been described.

Along the whole internal boundary of the lungs the note rises as one approaches the sternum.

The *clavicle* is usually used as a pleximeter and directly percussed. At its center it yields a markedly resonant note. Internally and externally pitch and resistance rise rapidly.

Height and mobility of apices.

Posterior Surface.—*Apices.*—The note is less resonant than in front, and rises as the spine is approached. This is the point where the height and mobility of the apices are best determined. To accomplish this the percussion should be carried upward during a forced and held inspiration, the limit of resonance marked, and the same procedure repeated during forced and held expiration.

The heavy muscles covering the back make necessary the use of greater force, and the note is less clear and satisfactory than in front. This is particularly true of percussion over the scapula itself, and a glance at a transverse section of the chest shows at once the futility of percussion near the spine. Passing downward, the liver dullness is encountered at the ninth rib in the scapular line.

Percussion Sounds.—It is customary to describe the percussion notes as resonant, hyperresonant or tympanitic, dull or flat.

Nothing but practice will serve to differentiate these sounds, but for the purpose of study or comparison all may at any time be elicited from different parts of a normal chest.

Readily studied on normal subject.

The *typical pulmonary resonance* is that of the upper axilla, and its pitch, intensity, and duration should be carefully noted.

The *dull note* is yielded by the liver below the lung margin, and modified dullness just above this point, where only the thin, wedge-shaped lower border intervenes.

The *flat note* or thigh sound is heard over the muscular tissues, such as the thigh or the deltoid muscle.

The *tympanitic note* is yielded by the stomach or intestine, as in Traube's semilunar space, and an important modification—viz., *dull tympany*—is heard on percussion over the main bronchi or upper sternum.

Characteristics of the Percussion Sounds.—All percussion notes possess certain well-recognized characteristics, and percussion itself determines resistance as felt by the pleximeter finger.

EXCURSION OF THE LUNG BORDERS IN THE NORMAL CHEST.

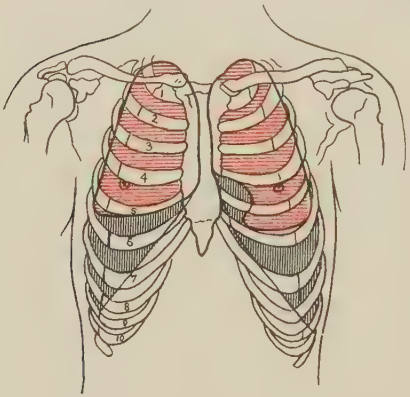


FIG. 66.—ANTERIOR SURFACE. LUNG BORDERS. FORCED EXPIRATION.

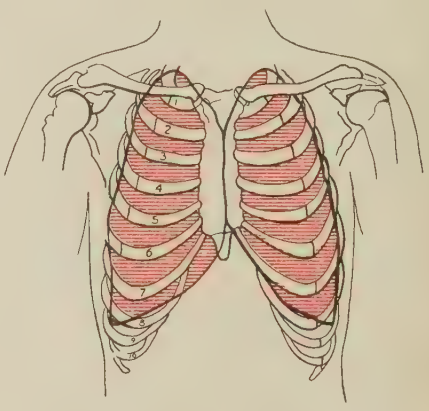


FIG. 67.—ANTERIOR SURFACE. LUNG BORDERS. FORCED INSPIRATION.

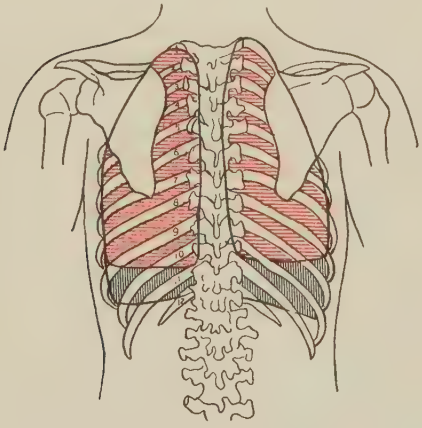


FIG. 68.—POSTERIOR SURFACE. LUNG BORDERS. QUIET BREATHING.

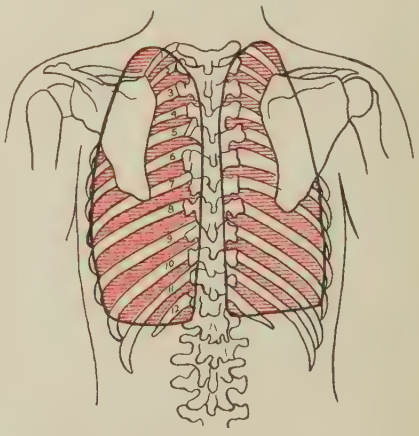


FIG. 69.—POSTERIOR SURFACE. LUNG BORDERS. FORCED INSPIRATION.

Each note has a certain quality, intensity, pitch, and duration. The *intensity* of any sound depends upon the energy and amplitude of vibration; its *pitch* upon the rapidity of the vibrations, varying with the tension; its *quality* upon the vibrating

material; its *duration* upon the strength and amplitude of vibration and the density and tension of the material. Increased resistance goes hand in hand with dullness, and guided by this alone a deaf man might make a very fair percussor.

The Lung Borders.—The position and mobility of the lung borders are affected in every serious chronic disease of the lung.

In tuberculosis they show a decided lack of mobility, both at apex and base. Tuberculosis.

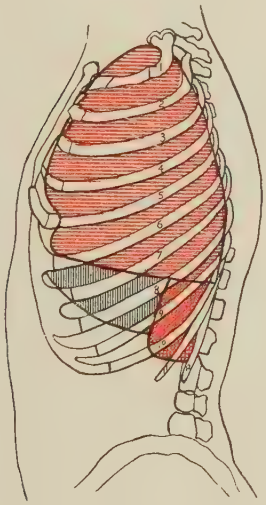


FIG. 70.—LATERAL SURFACE. FORCED EXPIRATION.

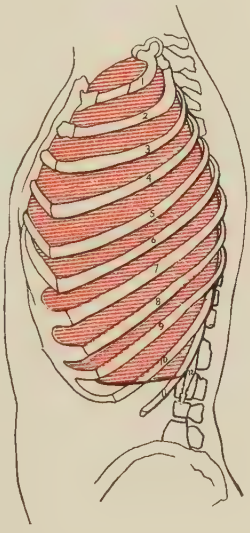


FIG. 71.—LATERAL SURFACE. LUNG BORDERS. FORCED INSPIRATION.

In emphysema, primary or secondary, they are lower than normal at the base, and markedly lacking in range of movement. Emphysema.

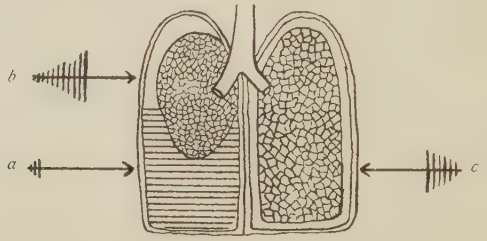
In vicarious emphysema the loss of movement is less marked.

In fibroid phthisis, chronic pneumonia, and pleural adhesion the change in position and movement is a striking symptom. Pleural adhesion, etc.

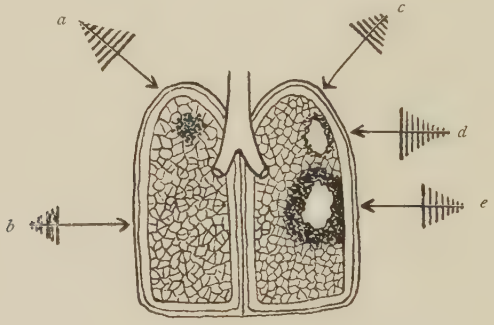
In illustrations Nos. 66 to 71 the respiratory changes of the lung border are clearly shown.

It must be borne in mind that all sound lungs can not be held to the same limits, and that equality of movement as between the two sides is the real test.

Hyperresonance.—This note is heard over distended, relaxed, or emphysematous lung tissue. In some cases of emphysema it is replaced by a note that is distinctly high pitched and lacking in resonance.



a. Pleural effusion. *c*. Normal lung. *b*. Hyperresonance above fluid exudate.



a. Hyperresonance over relaxed lung surrounding tubercular focus. *b*, *c*. Normal. *d*. Superficial cavity. *e*. Thick-walled cavity.

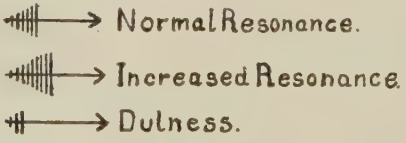


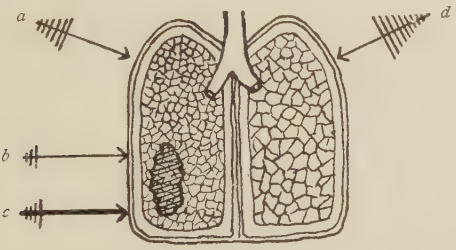
FIG. 72.

Tympany.—A tympanitic note may vary greatly in its pitch and intensity, such differences depending upon the size of the cavity in which it is produced, the condition of the walls, and the size of the communicating bronchus. The larger the cavity, the lower is the pitch. The greater the size of the communicating

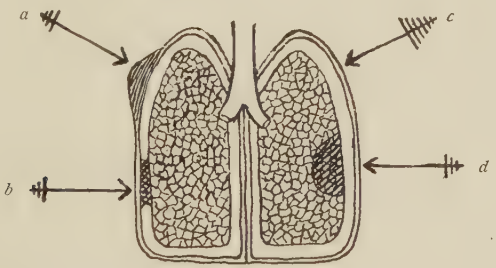
Open and closed.

opening, the higher is the pitch, and lastly the pitch of the percussion note varies directly with the tension of the walls. The second and third of the foregoing rules apply to the closed cavities as well.

Skodaic Resonance. — A tympanitic note is heard over



a. Normal. *d*. Hyperresonance (emphysema). *b*, *c*. Heavy and light percussion over consolidation.



Dullness from thick wall (*a*), (*b*) pleural adhesion, (*d*) new growth. *c*. Normal.

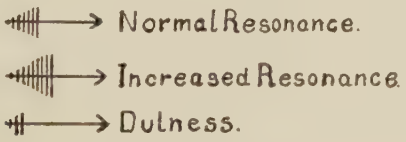


FIG. 73.

relaxed lung tissue, as, for example, in pleuritic effusion above the level of the fluid, in the neighborhood of an advancing pneumonic consolidation, in edema of the lungs, and in certain cases of apical tuberculosis. In the condition last named it may prove a most puzzling sign, and frequently leads the examining physician into a futile search for a lesion in the sound lung, he mis-

Apical tympany in tuberculosis.

taking the tympanitic or hyperresonant note of the affected side for the normal standard.

Dull in some cases.

Tympanitic Note in Pneumothorax.—In open pneumothorax the percussion note is extremely drum-like, but it should not be forgotten that in many cases of closed pneumothorax because of high tension the percussion sound is distinctly dull.

Overtones due to large cavity.

Amphoric Percussion Note.—The amphoric note invariably indicates a large cavity so formed as to produce selective reinforcement of vibrations. In order that the sound may be well defined, the vomicus must be superficial and freely communicating with the bronchus.

Diminished Resonance.—Resonance varies directly as the amount of air in the underlying structures accessible to a percussion stroke. Deep-seated areas of consolidation covered by air-containing lung tissue yield simply a mixture of the vesicular and dull note. Areas of consolidation at the surface of the lung yield a dullness exactly like that of the liver.

Pleural effusion and solid growths.

Flatness.—The absolutely dead or toneless note is quite characteristic of liquid pleural effusions or solid growths in close contact with the chest-wall. Every examiner should carefully study the sound, as it is frequently of great assistance in differential diagnosis, especially so in those puzzling cases of pleural effusion in which the breath- and voice-sounds have precisely the character of those heard in pulmonary consolidation. It is by no means a difficult matter to distinguish the two notes. In ordinary clinical work the physician has a positive means of differentiation in the exploratory puncture.

"Cracked-pot" sound

Special Modifications of the Percussion Note.—*Bruit de pot fêlé.*—This sound is precisely like the "chinking" produced when the palms of the hands are placed lightly together and struck against the knee. It may be present normally in the thin elastic chests of children if percussion be made while the child is crying. In the adult chest it can most readily be obtained in the infraclavicular region if there be a superficial cavity with thin walls. The mouth should be open, and the percussion stroke heavy and applied during expiration. This sign may also be present in cases of open pneumothorax, in the region of pneumonic areas, or above a pleural effusion.

Friedreich's Phenomenon.—The percussion note over a cavity may be higher during deep inspiration than in expiration.

Wintrich's Phenomenon.—The pitch of the percussion note over an open cavity is higher when the mouth is open.

Gerhardt's Sign.—This term is applied to the well-known variation in the percussion note due to change of posture, and, of course, dependent upon the presence of movable fluid in the vomicus.

Biermer's Sign.—In pneumothorax there is a decided change in the note corresponding to changes in the patient's position.

Coin Sound.—This is described under auscultation, page 248.

AUSCULTATION.

Slight importance of bilateral variations.

The first law of auscultation demands that the test of symmetrical breathing shall precede inference—in other words, before concluding that a departure from the type of breathing on one side represents a pathologic change, the corresponding opposite area should be investigated. Slight symmetrical departures from the normal are often comparatively unimportant, and usually temporary.

General data.

Basis of Auscultatory Phenomena.—The science of auscultation rests upon the same laws of sound that serve as a basis for palpation and percussion. When the stethoscope is applied to the chest, the sound heard is really that produced in the glottic chink, transmitted and modified by the bronchial tubes, lung tissue, and chest-wall. The nearer the stethoscope approaches the glottis, the greater is the predominance of a tubular element in the sounds heard. Lung tissue, by reason of its peculiar alveolar structure, superadds a sound of its own, modifying greatly the pure glottic sound. If, however, in any area the pulmonary structure be replaced by consolidation, the glottic sounds are transmitted almost unmodified. It will readily be understood that all degrees of shading may occur according to the situation of the areas of induration and their relation to the bronchi.

Deep-seated consolidation.

If, for example, the patch of thickened lung be remote from the surface, a vesicular sound due to overlying pulmonary tissue will be superadded to and modify the tubular sound. Again, the larger the bronchus that is in direct communication with the

indurated area, the more intense will be the sound. Lung cavities in communication with a bronchus yield modifications of the same glottic sound and follow the same general laws. In them we have a definite air-chamber surrounded by more or less rigid walls of consolidated lung tissue; if, then, they communicate with the bronchus, are wholly or partially empty, and if the communicating tube be itself unobstructed, the glottic sounds will be reinforced by and receive a peculiar quality from the walls of the cavity, and thus modified, will be transmitted to the surface of the chest.

Cavities.

Interposition of Air or Fluid Between Lung and Chest-wall.—Any form of pleural effusion, liquid or gaseous, acts ordinarily as a damper to vibrations, hence in any form of pleurisy with effusion, breath-sounds are likely to be lost below the level of the fluid. Certain exceptions to this rule will be considered later.

Open pneumothorax.

It will be readily understood that in the case of pneumothorax an opening between the pleural cavity and lung may be present, and that in such a case the physical signs would be those of a very large cavity.

Strength and pitch of voice.

It is hardly necessary in conclusion to point out the fact that the intensity of conducted sounds varies directly as the depth and intensity of the voice, and inversely as the thickness of the chest-wall.

Mediate and Immediate Auscultation.—Auscultation may be either mediate or immediate at the pleasure of the auscultator. Many forms of stethoscope have been devised for mediate auscultation; some, like the phonendoscope, so reinforce and intensify sound vibrations as to give them a character quite different from that ordinarily described. The chief characteristics of a good stethoscope are that it shall be of good caliber throughout, that it shall entirely close the external auditory canal, and further that it shall be so devised as to permit accurate contact without excessive pressure upon the ears. As a well-known medical teacher said to the author, "It matters very little what pattern of stethoscope be employed, provided the user possesses the requisite cerebration."

The stethoscope.

Necessary Precautions.—A quiet place is absolutely essential to good work; no matter what form of stethoscope be used,

or how concentrated be the attention of the examiner, outside noise will seriously interfere with the work.

Breathing.

Instruction of Applicant.—It may be necessary to show the person under examination just how he should breathe, and ordinarily the lips should be closed and the respiration be deep, uniform, regular, and quiet. Many patients will make one breath much deeper than another, or much noisier, and the examiner is very likely to be thus misled.

Special manœuver.

Attitude of Applicant During Auscultation.—The position of the patient during auscultation should vary with the different areas under investigation, precisely as in percussion, save that examination of the region of the posterior interlobular space requires that the arm be carried forward and inward, the hand resting upon the opposite shoulder. The scapula is thus carried forward and outward, and by its posterior border very nearly defines the division between the upper and lower lobes.

Pulmonary Areas Demanding Special Attention.—Fowler, of London, has emphasized the necessity for a special investigation of certain auscultation areas. His elaborate investigations prove that tuberculosis in nearly every case involves first the apex of the lung: not the extreme tip, but a point nearer to the posterior than the anterior surface, and somewhat external. He has also established the fact that the disease follows a definite "line of march," passing downward and involving the upper portion of the lower lobe, and tending to follow the line of the interlobar fissure. Hence the most important areas are:

"Line of march" of tuberculosis.

Important areas.

(*a*) *The apex posteriorly at a point opposite the second dorsal spine, but well toward the scapula.*

(*b*) *Anteriorly at or just below the middle of the clavicle.*

(*c*) *The supra- and infrascapular space.*

(*d*) *Along the inner border of the scapula when the hand of that side rests upon the opposite shoulder.*

(*e*) *The upper part of the axillary space.*

Vesicular Breathing.—This, the normal type, is heard over healthy lung tissue. Its characteristics are a peculiar rustling quality, low pitch, moderate intensity, with no pause between inspiration and expiration, the latter being separated from the former by no perceptible interval and having not more than one-

third its duration. Oftentimes, indeed, it is entirely absent in ordinary auscultation.

Vesicular respiration means, of course, healthy lung tissue.

Intensified or harsh vesicular.

Puerile or Harsh Respiration.—*Normal.*—In the chest of a child, or when listening over a lung that is performing vicarious duties, one hears the so-called puerile breathing which is practically intensified vesicular respiration. *Pathologic.*—It is best heard over the unaffected lung in cases of pleurisy with effusion or pneumonia.

Prolonged Expiration.—A respiratory sound possessing this as

FIG. 74.—AN IMPORTANT AREA.—(*After Fowler.*)
Position for auscultation of interlobar region.

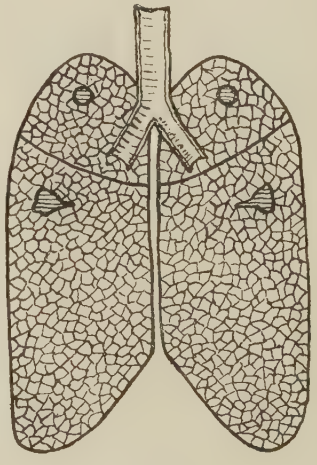


FIG. 75.—SELECTIVE POINTS IN PULMONARY TUBERCULOSIS.

Infiltration or relaxation.

its most marked characteristic is frequently heard, and suggests at once a difficulty in the expulsion of air from the lungs. If the expiratory note be high pitched, a small area of infiltration is at once suggested; if, on the other hand, the pitch be low, the examiner thinks of distention or relaxation of the lung tissue, such as occurs in emphysema, asthma, chronic bronchitis, or in the areas immediately surrounding an incipient tubercular deposit.

Suppressed Breathing.—The loss of the breath-sounds over any part of the lungs indicates either the interposition of some substance between the lung and the chest or an obstruction in

one of the bronchial trunks. Pleurisy with effusion, pleural growths, or thickening represent the former, and massive pneumonia, pressure of growths or aneurysm, or occlusion by foreign bodies the latter. Suppressed breathing is common at the apex in incipient phthisis, and in all conditions in which there is collapse of lung tissue.

Cog-wheel Breathing.—Much stress has been laid on this as a symptom of early phthisis, but great care should be taken to eliminate causal factors other than tuberculosis. This is particularly necessary in life-insurance work because the nervousness so frequently present in an applicant produces marked disturbances of the heart's action, irregular and unequal inspiration, and uneven muscular contraction. All of these factors may produce cog-wheel breathing, and in order to be of importance, it should be heard even when the breathing is regular and deep, and the heart action neither unduly violent nor greatly accelerated.

False *vs.* true.

The term cog-wheel is not descriptive; the breathing is wavy, and marked by distinct breaks. When genuine, it indicates, in general, imperfect expansion of some portion of the lung.

Bronchial Breathing.—*Normal.*—If a stethoscope be placed over the seventh cervical spine, bronchial breathing is heard. It differs from vesicular breathing in almost every particular; both inspiration and expiration are high pitched; between them is a distinct interval. Expiration is greatly prolonged, the sound being equal to or even greater than that of inspiration.

Characteristics.

Pathologic.—When such breathing is found to replace the vesicular murmur, consolidation or compression of lung tissue is present and connected with a patent bronchus. Thus it is heard over areas of consolidation in pneumonia or in phthisis, or over compressed lung posteriorly in pleurisy with effusion, or over those portions of the lung that suffer compression from mediastinal or other tumors.

Pulmonary condensation or consolidation.

It is well to remember that in some cases of pleurisy with effusion the voice- and breath-sounds are well conducted; in such cases the percussion note is likely to point to the correct diagnosis, being too flat and toneless for mere consolidation of lung tissue.

Sometimes heard over pleural effusions.

Bronchovesicular Breathing.—*Normal.*—If the stethoscope be placed over the second intercostal space at the sternal border,

or upon the upper interscapular region of the normal chest, the sound conducted to the ear is a curious mixture of vesicular and bronchial breathing.

Incipient tuberculosis and deep consolidation.

Pathologic.—There is no more important clinical study than this modification, as it represents, when heard over the lung, in a majority of cases, early tuberculosis or deep-seated central consolidation.

Tubular Breathing.—*Normal.*—Tubular breathing is heard normally over the glottis, and differs from bronchial breathing in being more intense and possessing a peculiar whiffing quality.

Superficial consolidation.

Pathologic.—Its signification when heard over pulmonary areas is found in its association with complete superficial consolidation of lung tissue. It is important that this breathing should be carefully studied because of its intimate association with or near likeness to cavernous and amphoric breathing.

Cavity.

Cavernous Breathing.—The sole important difference between cavernous and tubular breathing lies in the fact that in the former the pitch is low and the quality distinctly hollow. For its production a pulmonary cavity is necessary, empty or partially so, and no less than an inch in diameter.

Large superficial cavity.

Amphoric Breathing.—Amphoric breathing is exactly the same as cavernous, save that it possesses a metallic quality, the sound resembling that produced by blowing across the mouth of an empty bottle. It is heard over large superficial cavities and in open pneumothorax. In all cases of cavity free communication with the bronchus is necessary to the production of the typical sound.

Vocal Resonance.—*Normal.*—If the stethoscope be applied to the axillary region of a healthy chest and the patient repeat the word ninety-nine slowly, the voice is heard, but the words can not be distinguished; moreover, the ear recognizes the fact that the sound is produced at a point some distance from the stethoscope.

The production of such normal vocal resonance depends upon exactly the same vibration, and is subject to the same laws, as govern vocal fremitus and the transmission of breath-sounds and râles. Just as normal vocal resonance is associated with a vesicular murmur and a normal percussion note, so also we find

variations in this resonance corresponding to every variety of abnormal breath-sounds and percussion tones.

Bronchophony (*Bronchial Voice*).—*Normal.*—Bronchophony may be heard in the normal chest over the manubrium. At this point the voice seems to be directly at the mouth of the stethoscope, and the sense of remoteness so marked in normal resonance is altogether lost. Voice at chest-piece of stethoscope.

Pathologic.—Bronchophony is heard in varying degrees under the same conditions that produce bronchial and bronchovesicular breathing.

Pectoriloquy (*Tracheal Voice*).—*Normal.*—Pectoriloquy corresponds to the normal voice as heard over the trachea. It differs from bronchophony in that the words seem to be distinctly articulated and spoken directly into the ear. Whispered pectoriloquy is the term applied when the whispered voice is thus transmitted. Voice at listener's ear.

Pathologic.—It is heard over superficial cavities and consolidation.

Increased Vocal Resonance of Heightened Pitch.—Vocal resonance may be only slightly increased with a rise in pitch in cases of imperfect consolidation of lung tissue, or in cavities that are not surrounded by consolidated lung tissue.

Egophony.—*Pathologic.*—Egophony is a peculiar modification of the voice-sound that gives it a bleating or distinctly nasal character. It is most frequently heard at the upper level of pleuritic effusion, and just above the area of consolidation in pneumonia. Attention is not infrequently directed to small pleural effusions, acute or subacute, by encountering egophony at the inferior angle of the scapula. Valuable sign in small effusion.

Diminished Vocal Resonance.—The following conditions result in diminution or loss of the normal vocal resonance:

Normal.—(*a*) Weak voice.
(*b*) Excessively thick wall.
Pathologic.—(*c*) Emphysema or relaxed lung from whatever causes.
(*d*) Effusion into pleural cavity (liquid or gaseous).
(*e*) Pleural growth or thickening.
(*f*) Massive pneumonia.
(*g*) Occluded bronchus due to foreign bodies or to pressure.

Echoing Resonance.—*Coin Sound.*—The coin sound proper

is a peculiar bell-like note heard over the affected side in pneumothorax when a coin is placed upon the chest and lightly struck with another.

The auscultator usually applies his ear or stethoscope to the back, and an assistant manipulates the coin upon the anterior surface of the chest. Echoing or amphoric resonance of the voice and heart-sounds may be heard under similar conditions.

RALES.

Rales are either dry or moist, and a consideration of the anatomic structure of the lungs and pleura makes it easy to understand the mode of their production and their significance. Aside from the friction rale, which will be considered further on, dry rales may be divided into two groups:

(*a*) Sibilant or whistling rales.

(*b*) Sonorous rales: "At one time resembling snoring, at another the sound of a bassoon, and very frequently it is like the cooing of a turtle-dove." *

Determinant conditions.

They are of all grades of pitch and intensity. In passing from the very feeblest sibilant to the most raucous sonorous rale, the differences depend upon the size of the tube in which they are produced, its proximity to the surface, and the character of the respiration itself. Such rales alone or in association with others are most frequently found in bronchitis, asthma, and emphysema.

Stenosis.

Stridor.—Stridor is the sound heard over the trachea or the primary bronchus that is obstructed by aneurysm, tumor, or a foreign body. A similar sound is heard in paralysis of the abductors, such as may result from pressure upon the pneumogastric or recurrent laryngeal nerve.

Diversity and modifying conditions.

Moist Rales.—In the consideration of moist rales the chief points to be noticed are their character, size, pitch, and resonance. A moist rale may be produced at any point from the glottis to a terminal alveolus. It may be caused by the ordinary mucus or mucopurulent secretion of a bronchitis, or by the passage of air through the thin fluid of a pulmonary cavity or a

* Bell's Notes: "Diseases of the Chest," by William Stokes, p. 11. Philadelphia, 1844.

pneumothorax. It may be associated with consolidation of all kinds, or cavity of any degree, and must therefore be affected in pitch, quality, size, and intensity by its surroundings.

Character of sound.

Crepitation.—Beginning with the smallest rale we have crepitation, a sound compared to the crackling of burning salt, or better, to that produced by rolling a lock of hair in the fingers, held close to the ear. Crepitation signifies simply that air is entering into a collapsed vesicle. It is one of the early signs of lobar pneumonia and incipient tuberculosis, but may normally be heard at the apex or base of the lung when the *first* deep inspiration is taken; but in life-insurance examinations the respiratory manœuvers preceding auscultation should remove this element of confusion. Such rales are also heard persistently at the base of the lung in pulmonary edema and hypostatic congestion. They are heard always at the end of deep inspiration, and are distinctly finer and more delicate than any other variety of rales. In ordinary examinations it is extremely important that a crepitation produced by the application of the stethoscope or ear to the chest-wall be not confounded with them.

Possible sources of error.

Fine and medium.

Crackling Rales.—Three varieties of crackles are recognized by the diagnostician. The *fine crackling rales* are heard chiefly in inspiration, and indicate, as a rule, commencing infiltration. Heard at the apices, they always strongly suggest an incipient tubercular process. They are heard very early in resolving pneumonia. Medium crackling rales are of the same general nature as the foregoing, but coarser. They are heard over softening tubercular areas, bronchopneumonia, and resolving lobar pneumonia.

Large Crackling Rales.—These are still coarser than the foregoing, and point usually to extensive softening in a tubercular area.

Mucous Click.—This sound stands midway between the crackling and bubbling or gurgling rales. It is a *sticky*, *mucous* crackle, and is commonly heard at the apices in incipient tuberculosis.

Bubbling Rales.—These may be small, medium, or large, and are usually readily recognized.

Gurgling Rales.—These are usually heard over large cavities during cough or in forced inspiration.

Pitch and Resonance of Rales.—All varieties of rales have

Resonant, consonating, and echoing rales.

a certain pitch and degree of resonance directly attributable to their surroundings. One that is produced in a cavity surrounded by consolidated lung will have many of the qualities of tubular or amphoric breathing, hence we speak of resonant rales, echoing rales, consonating rales, etc. There are certain special sounds of great interest, and chief among these are post-tussive suction, metallic tinkling, and succussion.

India-rubber ball sound.

Post-tussive Suction.—This interesting physical sign is pathognomonic of cavity formation, and has been aptly termed "the india-rubber ball" sound. It is supposed to be due to the expansion of a collapsed thin-walled cavity communicating with a bronchus.

Echoing rales.

Metallic Tinkling.—This term is applied to the beautiful musical sound sometimes heard over a very large cavity with dense, smooth walls, and in pneumothorax. This phenomenon is really due to the production of echoes, and when low pitched, is often termed amphoric tinkling.

Hippocratic Succussion.—This is the well-known swashing sound produced by the somewhat heroic measure of violently shaking the victim of a pneumothorax.

Can not always be distinguished from crepitation.

Friction Sounds.—True friction is produced by the attrition of pleural surfaces roughened by inflammation. Many attempts have been made to lay down rules by which this friction may be differentiated from certain forms of crepitation. As a matter of fact, cases occur in which the distinction is impossible; on the other hand, in the vast majority of instances a true friction is unmistakable, often palpable. The quality of the sound is crackling or rubbing; it is ordinarily distinctly superficial, usually double in rhythm, and, what is still more important, is associated in most cases with pain on deep inspiration.

THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS.

How to detect incipient tuberculosis is one of the most interesting and difficult of diagnostic problems.

Phthisis is the greatest enemy of insurance companies, and in spite of the fact that their risks are all selected, nearly one in every five dies of this disease. It is important, therefore, to understand clearly the possibilities of early diagnosis, and certain cardinal points should be borne in mind by every medical examiner : Mortality.

(*a*) *Lightweights are especially liable to the disease.* Cardinal points.

(*b*) *A person may be a heavyweight and present every outward sign of good health and yet be in the active stage of pulmonary tuberculosis.*

(*c*) *Periods of arrest are especially common, and permit a person to resume the appearance of robust health.*

(*d*) *Cases of arrested tuberculosis are always especially liable to relapse, and having once relapsed, become doubly difficult to manage.*

(*e*) *The first signs of tuberculosis are, in most instances, to be found in the upper lobe of either the left or the right lung, or at the junction point between the right upper and lower lobes posteriorly.*

(*f*) *One of the best evidences of tuberculosis is a diminution of the lung movement of the affected side.*

(*g*) *One of the earliest signs is the acceleration of the pulse-rate and a slight rise of temperature.*

The early diagnosis of pulmonary tuberculosis has advanced greatly during the past twenty years, and as a result the general mortality statistics have been favorably affected; but, unfortunately, there still remains much room for improvement in this direction, and far too many men and women present themselves for treatment in the advanced and hopeless stages of the disease.

Examiner's special difficulties.

For the insurance examiner, early diagnosis is surrounded by added difficulties because of the fact that the average insurance applicant is an unwilling witness. The physician is therefore forced to rely almost wholly upon physical signs. It can not be too emphatically stated that every case presenting itself for examination should be thoroughly investigated, and in such as present the appearance of light weight or have a poor family history special care is necessary. The early signs of the disease may be thus grouped :

Early Signs of the Disease.—(*a*) *Impaired digestion* appears very early in the disease, and cases are frequently treated for months as dyspeptics before a pulmonary lesion is recognized.

(*b*) *Progressive Loss of Weight.*—Progressive loss is the rule, yet one of the most frequent causes of error is the apparent good health and heavy weight of a victim of pulmonary tuberculosis. The author recalls many cases in which the patients were far advanced in the disease, yet still maintained a weight much above the average, and a high color that was most misleading and deceptive. This is especially true of cases of florid phthisis occurring in heavyweights.

(*c*) *Temperature.*—A slight daily rise in temperature is now universally recognized as a symptom of great importance. The rise usually occurs in the late afternoon, but is occasionally reversed. Why life-insurance companies have not more generally recognized the importance of this symptom is a difficult matter to understand. So far as the examiner is concerned, he should, for his own protection, take the temperature in every case in which the pulse exceeds the normal rate.

Tuberculin.

(*d*) *The Reaction to Tuberculin.*—The tuberculin test itself is too well known to require a description. Medical opinion is divided upon the question of its utility and safety, and *in life-insurance work it is wholly impracticable.*

(*e*) *Cough.*—The early cough of phthisis is likely to be unnoticed, and is not usually of a character to excite suspicion until the disease is well advanced. It may be the typical dry, hacking cough, or it may be little more than a clearing of the throat. The history of cough is not likely to be elicited by the insurance examiner, but he frequently has occasion to notice it during an examination.

(*f*) *Rapid Pulse.*—A rapid pulse is a very constant feature in incipient tuberculosis, and, as before stated, should suggest the propriety of determining the temperature of an applicant.

PHYSICAL SIGNS.

Often obscure and misleading.

The physical signs of *incipient* tuberculosis are often obscure or even misleading. Harsh breathing usually associated with prolonged expiration, if limited to one apex, is suggestive. Unilateral dullness is an important sign, but not more so than its opposite, unilateral hyperresonance; the latter is common in the early stages, and is due to the relaxation of areas of lung surrounding a spot of infiltration. Great care must be taken to avoid those errors in diagnosis which arise from a failure to appreciate the fact that normal lung-resonance varies, though within narrow limits, and that even in health the breathing over the right apex is distinctly harsher than over the left.

Special manœuver.

Rales.—Excepting the fine crepitation occasionally heard during the first deep inspiration in the case of an unexpanded lung, *all rales of whatever character heard over the lung, and especially at the apices, are important.* They may be of any form or description. In all doubtful cases the person under examination should be asked to cough repeatedly and draw a long breath, as this manœuver sometimes brings out obscure rales.

Very important.

Lung Movement.—The fact that pulmonary tuberculosis, even in its earlier stages, materially affects expansion, has been established beyond question by fluoroscopic methods. Not only do the bases of normal lungs show the marked advance and recession indicated in figures 66 to 71, but the apices show a marked rise and fall easily determined by percussion of the suprascapular region, and invariably modified by apical tuberculosis.

Caution.

It must, nevertheless, be borne in mind that it is the exception to find the lungs free from all adhesions postmortem, and therefore such signs are chiefly valuable when apical and taken in connection with other signs suggesting an incipient tubercular process.

TUBERCLE BACILLI IN THE SPUTUM.

The finding of the bacilli in the sputum makes a diagnosis positive, but this procedure is not often available for the life-insurance examiner.

Methods of Staining the Tubercle Bacillus in the Sputum.—Only two methods will be described.

Solutions and Reagents Required.—

Standard staining solutions.

1. Carbolfuchsin Solution (Ziehl-Neelsen):

   Saturated alcoholic solution of fuchsin, . . . 10 c.c.
   Five per cent. aqueous solution of carbolic acid, ... 90 "

2. Löffler's Methylene-blue Solution:

   Saturated alcoholic solution of methylene-blue, 30 c.c.
   1 : 10,000 aqueous solution of caustic potash, . 100 "

3. Gabbett's Methylene-blue Solution:

   Methylene-blue, ... 2 c.c.
   Sulphuric acid, ... 25 "
   Distilled water, ... 75 "

4. Ninety-five per cent. alcohol.

5. Nuttall's Decolorizing Solution:

   Sulphuric acid, ... 20 to 30 drops.
   Alcohol, ... 50 c.c.
   Distilled water, ... 100 "

The principles underlying the differential staining of the tubercle bacillus are extremely simple.

Usual Steps.—*Selection of Material.*—One must first select the material most likely to contain bacilli, and with a sterilized needle or platinum loop it is an easy matter to pick up some of the small yellow masses or the thickest portion of the sputum. The most desirable specimens lie within the masses, and the sputum is usually spread upon some smooth surface, like a blackened plate, or a piece of glass placed over black cloth or paper, or backed with black paint. The sputum is smeared as thinly and evenly as possible over a clean cover-glass, or placed between two cover-glasses, which are then firmly pressed together and drawn apart, leaving a smear upon both slips.

Making the "smear."

Drying.—The specimen is then thoroughly dried in the air or by *very gentle* heating.

Fixing.—It is then fixed by being passed three or four times

through the flame of a Bunsen burner or alcohol lamp, and is ready for the stain.

Staining.—The bacilli are known by their peculiar resistance to decolorizing substances, holding the original stain so firmly that all associated bacilli and ground material may be completely decolorized, or even counterstained, without any interference with or loss of the original color. Any mineral acid serves the purpose of a decolorizing agent, nitric and sulphuric acids being most commonly used.

Resistance to decolorization.

Gabbett's solution decolorizes and restains the background and associated germs.

A Simple Method.—*To show only the tubercle bacillus*, drop solution 1 upon the smeared cover-slip until the surface is well covered. Hold it over the flame until steam arises or small bubbles appear, withdraw for a moment, and reheat, repeating the process for three minutes. *One is not likely to overstain.* More stain must be dropped on from time to time to replace that lost through evaporation. Any device may be used that insures the contact of the film with hot carbolfuchsin stain for not less than three minutes.

Washing.—The specimen is then thoroughly washed until the water ceases to be colored.

Decolorizing.—It is then washed in Nuttall's mixture, or any dilute solution containing nitric or sulphuric acid. The actual strength does not greatly matter, though nothing stronger than 25 per cent. should ever be used, and, better still, nothing over 10 per cent.

The important point is that the specimen should be immersed in the acid solution until no color or only the faintest pink can be seen after washing in water.

Second Washing.—The smear is then thoroughly washed to remove all acid. Many follow the acid with immersion in alcohol (95 per cent.) and wash a third time.

Second Drying.—The specimen is then thoroughly dried between blotting- or filter-paper or in the air.

Mounting.—A drop of balsam is placed upon a clean glass slip, the specimen mounted, and examined with the oil-immersion objective, or, lacking that, with the highest power objective obtainable.

Thus prepared, the tubercle bacilli appear as tiny red rods, singly or in pairs or groups, against a pure white background.

Gabbett's Method.—If Gabbett's method be used, the specimen is placed in the methylene-blue-sulphuric acid solution for one minute after the first staining and washing. The steps would be in order—spreading, drying, fixing, staining in carbolfuchsin, washing in water, Gabbett's solution for one minute, thorough washing, drying, mounting.

Appearance.—The bacilli would appear red in a blue field, and all associated germs would take the latter color.

It is easy to counterstain the specimen prepared by the first method. If thought desirable, the decolorized specimen may be placed in or covered by some of the Löffler's solution from fifteen to thirty seconds, washed until excess stain is removed, dried, and mounted.

Special Methods of Preparing Sputum for Examination.—It is necessary oftentimes to resort to special methods for the detection of the tubercle bacillus, and one can never be sure that they are lacking until repeated examinations have been made.

Liquefaction and Sedimentation.—Charles E. Simon recommends the following procedure :

Boil in a large test-tube equal amounts of the sputum and distilled water to which have been added six or eight drops of a 10 per cent. solution of sodium hydrate. Add water from time to time and continue the process until the sputum is completely liquefied. Set aside, or place in centrifugal machine, and examine the sediment.

Incubating.—If an incubating oven be accessible, the sputum may be placed therein and the germs allowed to multiply as in cultural methods. *A failure to find tubercle bacilli in any given case does not absolutely exclude tuberculosis.* In life-insurance work the sputum must, if possible, be obtained by the physician in his own office or at the house of the applicant. Small doses of potassium iodid administered a day or two in advance may be of assistance in promoting free secretion.

PHYSICAL EXAMINATION OF THE ABDOMEN.

The average examination blank touches but lightly, if at all, upon the condition of the abdominal viscera, and it rarely happens that a critical inquiry is instituted. It is, nevertheless, necessary to consider some of the more important and fundamental points relating to the investigation of this region, and, as any marked departure from the normal seriously impairs the risk, it is chiefly necessary to establish the fact that normal conditions are present. The derivative word "abdo" (I conceal) clearly indicates the examiner's difficulties, but, fortunately, it is easier to affirm a normal than to differentiate abnormalities.

Technic.—All varieties or subdivisions of clinical methods are applicable to this department of clinical work, but it is necessary that certain general rules be carefully observed if good results are to be obtained.

Muscular relaxation.

Attitude.—First, the patient's position must be such as to relax the abdominal walls; the head and shoulders should be slightly raised, knees somewhat drawn up, and the *feet firmly placed* so that no muscular tension is required to maintain the position. Oftentimes more complete relaxation and a better field are obtained if the legs are merely extended.

Breathing.

The breathing should be easy and natural unless deep inspirations are desired, and it is always best to keep up some inquiry or conversation that will divert the attention of the person under observation. If a critical examination be attempted, the bladder, stomach, and bowels should be empty. If the bimanual method be adopted in the case of movable organs or growths, the one hand should remain almost motionless while the other directs the movement of the part under examination. In the examination of any movable organ with a distinct edge, such as the liver or spleen, the hands should be placed so that the tips of the fingers will be at right angles to the border, thus making the most of

Proper use of the hands.

the impact. The examiner's hands should be warm; the abdominal wall should be depressed by the palm, and not by the tips of the fingers only; one accomplishes little by digging or grasping. Any attempt to examine a rigid abdominal wall is futile, and if by patient and repeated trials relaxation can not be secured, an examination under anesthesia is the only solution, and one not likely to be applied in life insurance. Great care should be taken to avoid the mistakes so frequently caused by a rigid rectus muscle.

Points to be Determined.—In the case of all examinations one seeks to answer the following questions: (*a*) *The condition of the organ under observation* (size, outline, condition of surface, mobility, tenderness); (*b*) *absence or presence of swellings or tumors* (intra-abdominal or extra-abdominal, size, outline, surface, mobility, tenderness, associated symptoms); (*c*) the *presence of pain or tenderness* (its intensity and character, exact location, the effect of pressure). It will be remembered that in nearly all inflammatory conditions pain is increased by pressure.

Regional Divisions.—A simple and satisfactory subdivision of the abdomen has been suggested by Ballance. A vertical and a horizontal line, intersecting at the umbilicus, divide the abdomen into four quadrants:

Right Upper.	Left Upper.
Liver and gall-bladder.	Left extremity of liver.
Head of pancreas.	Spleen.
Kidney.	Splenic flexure of colon.
Colon, hepatic flexure.	Left kidney.
Pyloric end of stomach.	Pancreas.
	Fundus of stomach.
Right Lower.	**Left Lower.**
Colon.	Colon.
Cecum.	Sigmoid flexure.
Appendix.	

The small intestines are spread over the whole lower abdomen. The uterus and ovaries are pelvic in location.

General Inspection.—As in the case of the chest, one would look for general or localized changes in form.

General Distention.—This as a chronic condition may be due to—

Tympanites.

Ascites.
Chronic tuberculous peritonitis.
Dilatation of stomach or colon.
Pregnancy.
Ovarian tumor.

Localized Distention or Swelling.—
Hysteria (*phantom tumor*).
Separation of recti.
Herniæ.
Abscess.
New growth.
Obstruction.

General retraction as a chronic condition may be due to—
Cancer of stomach or esophagus.
Chronic lead poisoning.
Chronic diarrhea and dysentery.
Wasting diseases.

Surface Indications.—Scars may indicate important past illnesses, injuries, or operations; *striæ*, past pregnancy or obesity; or the caput medusæ may suggest a hepatic cirrhosis. *Any unusual prominence of the superficial veins suggests an obstructed portal circulation.*

Aside from such general considerations, the insurance examiner is chiefly concerned with the stomach, liver, spleen, appendix vermiformis, and hernial openings.

Method of Examination.—To establish the normal condition of these organs the examiner should proceed as follows:

The Liver.—*Inspection* is ordinarily negative, though any pathologic increase in size produces a significant fullness in the right upper quadrant.

Palpation.—The hand is placed flat upon the abdomen just to the left of the rectus muscles and several inches below the costal margin, the finger-tips pointing upward; the wall is slightly depressed, and the hand, held motionless during a deep inspiration, rises slightly as that movement nears completion.

The result is usually negative in the case of a normal liver. In thin walls the margin may be felt as a soft, yielding body of about the consistency of the lower lip at its junction with the mucous membrane.

Percussion.—The following table * gives the normal percussion outline :

	Middle Line.	Mammillary Line.	Midaxillary Line.	Scapular Line.
Upper limit. Deep dullness.		Fourth space.	Seventh space.	Ninth space.
Upper limit. Superficial dullness.	Blend with heart dullness.	Sixth rib.	Eighth rib.	Tenth rib.
Lower limit.	Hand's breadth below base of xiphoid.	Costal margin or somewhat above or below it.	Tenth space.	Blends with kidney dullness.

Applicant recumbent for anterior, erect for posterior, percussion ; shallow breathing.

The Spleen.—The spleen yields deceptive percussion outlines, and, unless greatly enlarged, no signs on inspection.

Palpation.—The applicant should be placed on his right side. The examiner, standing at the applicant's right, places his righ hand over the lower ribs posteriorly and attempts to press the spleen forward. The left hand placed opposite the tenth and eleventh ribs pointing obliquely upward and to the right, is somewhat depressed during a full inspiration, rises as it nears completion, and meets the soft splenic margin if that organ be enlarged.

Care should be taken to commence well below the costal margin and work upward with each inspiration, and the commonest source of error lies in the faulty impression received at the costal margin at the end of inspiration. If the spleen be markedly enlarged, it passes obliquely downward and to the right and usually presents a distinct notch in its free border.

The Stomach.—Percussion and auscultatory percussion are the means chiefly employed in determining the size and position of the normal stomach. The lower limit of gastric tympany should lie above the umbilicus and pass but little to the right of the median line. Its upper limit reaches oftentimes nearly or quite to the left nipple or fourth left interspace.

* Hutchinson and Rainy, "Clinical Methods," p. 66.

By placing the stethoscope bell over the epigastrium in the parasternal line, and percussing or flicking the surface of the abdomen along lines radiating from this as a center, the limits of the peculiar stomach resonance are quite easily determined, and correspond roughly to the size of the organ. Inflation and other measures are not likely to be required in life-insurance examinations.

The Region of the Appendix.—The area known as McBurney's point should be carefully palpated and any increased resistance or tenderness noted. *It is always wise to go through a precisely similar procedure upon the opposite side before drawing any conclusions.* Pain or tenderness on pressure is frequently indicated by muscular contraction or the applicant's expression, even when denied by him.

Some Important Points.—*Pulsation.*—Aneurysm is the *rarest* cause of abdominal pulsation.

Visible Peristalsis.—Peristaltic waves arising from the stomach run from left to right; from the colon from right to left. If due to obstruction in the ileocecal region, they form the ladder pattern in the middle of the abdomen.

Respiratory Movement.—Normally, the epigastrium rises in inspiration and falls in expiration.

The Umbilicus.—The umbilicus is normally depressed, and is movable unless the abdomen be tense.

Ascitic Fluid.—Movable dullness, bulging of the flanks when the subject is recumbent, and the ascitic wave-thrill transmitted from side to side on tapping, are the characteristic signs. In doubtful cases dullness over the region of the umbilicus when the person under examination is on his hands and knees proves the existence of fluid.

The Gall-bladder.—The gall-bladder is not palpable if normal. If it be distended or the seat of a growth, it moves with respiration, and is movable to right and left about a fixed point of attachment corresponding to the ninth costal cartilage.

Localized areas of resistance or tenderness are extremely important and significant.

Tumors of the stomach, liver, gall-bladder, and spleen, if not anchored by adhesions, move with respiration.

Renal tumors may or may not be movable. If malignant, they

are usually fixed. If movable, it is found that motion begins later in the inspiratory descent of the diaphragm than in the case of those organs that are distinctly subdiaphragmatic.

To discuss the many obscure diseases of the abdominal viscera would exceed the scope of this work; it must suffice, therefore, to point out the means of proving them sound.

THE EXAMINATION OF THE URINE IN LIFE INSURANCE.

Narrowness of insurance inquiry.

Such brief and simple inquiries concerning the urine as are to be found upon the examination blank of insurance companies do scant justice to the importance of the work involved, yet there seems to be a strong impression in the minds of medical directors that even these requirements are not always properly fulfilled by the medical examiners.

Wide scope of clinical examination.

Negligence in this direction seems inexplicable when one reflects that no other body fluid, be it secretion or excretion, furnishes so great an amount of information as does the urine when carefully and intelligently studied. By its changes the clinician may read, not alone the variations in nutrition and waste, but the status, and oftentimes the exact nature, of both local and general disease.

Bright's disease, diabetes, spermatorrhea, cystitis, pyelitis, gonorrhea, oxaluria, lithemia, the presence of fever, a failing heart, typhoid fever, pneumonia, septicemia, urinary and general tuberculosis, filaria sanguinis hominis, dyspepsia, chronic appendicitis, hysteria, and impending or established jaundice may be mentioned as a part of the long list of diseases that may be either directly diagnosticated or strongly suggested by urinary signs.

Affords direct evidence.

In this excretion the insurance company has a means of inquiry which false statement can not affect, and the medical examiner a simple method of investigation that may save his reputation from damage and protect the company's funds against fraudulent attack.

Scope of this chapter.

In this manual no attempt will be made to treat the subject exhaustively, but rather to give, in a concise form, such information as will enable the examiner to act promptly and efficiently in all cases. The busy medical man is better off with a few formulæ thoroughly understood and clearly in mind than with a

multitude of hazy memories. His work is, moreover, chiefly qualitative, and no attempt will be made to deal with complicated methods. A few simple quantitative tests are at times indispensable, but in every instance only those that are both reasonably accurate and distinctly time-saving will be considered.

The following points are covered in examination blanks, and will be considered seriatim.

The insurance companies ask their examiners the following questions:

"Was the specimen passed in your presence?" "Do you know the urine examined to be that of the applicant?"

Answer must be "yes."

In the case of a male applicant it should always be possible for the examiner to give an affirmative answer to such questions, for the urine should invariably be passed in his presence, or at least under circumstances that exclude all possibility of deception.

It is unsafe to assume that any man is absolutely trustworthy in this regard; hence it matters not who the applicant may be, the company's rules must always be rigidly enforced.

Much tact may be required to avoid antagonizing some thoroughly honorable gentlemen who, in all innocence and sincerity, proposes to send a specimen by messenger, but as a rule the company's instructions may be pleaded, and will be cheerfully accepted as a sufficient excuse for any arbitrary requirement. It need hardly be said that in this, as in all other similar instances, the examiner should scrupulously avoid the appearance of suspicion or the expression of distrust.

Case of substitution.

A case of substitution came recently to the author's notice in which the fraud was attempted by a business man of high standing who was an intimate personal friend of the examining physician. Through overconfidence this physician accepted a bottle of normal urine sent by the applicant, but was by a fortunate accident obliged to secure another specimen; in obtaining this he experienced such difficulty as to excite his suspicion. It proved upon examination to be loaded with albumin, and an inquiry revealed the fact that his friend had been for more than a year under a physician's treatment for interstitial nephritis.

An applicant will frequently say that he has just passed water, but as a rule there is a sufficient amount available to answer the

purpose of the examiner. If delay is unavoidable, an appointment at the house or office of either party should be made for a later hour of the same day.

Temperature important.

It should be remembered that any freshly passed urine is warm, as an attempt is sometimes made to substitute one for another while at the urinal.

A prevalent error.

A curiously persistent idea is entertained by physicians that the early morning urine furnishes the best clinical evidence. This is quite contrary to the truth. The best specimen is that of the mixed urine for twenty-four hours, but that portion most likely to show departures from the normal is excreted about three hours after a meal, and preferably after exercise. The early morning urine is not infrequently quite normal in persons suffering from diabetes or interstitial nephritis, whose urines may always contain sugar or albumin after meals.

In life-insurance work the examiner is obliged to deal with single specimens taken at the time an examination is made. If, however, doubt arise, specimens should be procured at those periods when the urine is most likely to contain abnormal substances.

A futile question in life insurance.

"What is the total amount of urine passed in twenty-four hours?"

This is an unusual question, and rarely proves an effective one, for the reason that an applicant has only the vaguest notion of the amount passed.

In ninety-nine cases out of one hundred he will protest that he does not know, but that the amount is normal or "all right." However impracticable in life-insurance work, the question is, nevertheless, a most important one from the clinical standpoint. Indeed, the amount of urine passed in connection with the amount of solids it contains is often the very keystone of the diagnostic arch, measuring, as it does, the actual work of the kidney.

Clinically important.

When, as may *exceptionally* happen in insurance work, an examination of the whole urine is requested, great care should be taken in its collection.

First, the jars or bottles used should be thoroughly cleansed, and if possible rinsed in boiling water. They should be kept tightly corked and in a cool place.

Second, the urine passed during the day should be separately

Methods of collecting the twenty-four-hour urine.

collected and kept apart from that passed during the night. The first urine passed after rising should be discarded; the remainder passed from that time to and including bedtime should be collected, and constitutes the "day urine." The amount passed during the night following and upon rising the next morning constitutes the "night urine."

Day *vs.* night.

Of these two specimens, the amount of the day urine should be the larger, usually in the proportion of 2 to 1 or even 4 to 1,—*i. e.*, twice or even four times as great,—and any tendency to equality between the day and night excretion points in itself to some serious derangement, an increase in the amount of urine passed at night being a common symptom of interstitial nephritis.

Polyuria.

The total amount for twenty-four hours varies physiologically within wide limits, ranging from 500 to 2000 c.c. In general it may be said that an increase may be temporary or permanent, and due either to functional disturbance or to organic disease. An increase may also be due to the ingestion of large amounts of water or other fluids, beer and gin being especially diuretic, or to the use of certain drugs, to hysteria, migraine, or low temperature.

Such polyuria is temporary; on the other hand, chorea, pyelitis, amyloid kidney, interstitial nephritis, and diabetes insipidus and mellitus are examples of serious and more or less permanent causes of polyuria. Except in diabetes mellitus, an increased flow results in a lowered specific gravity. In diabetes insipidus the specific gravity may be low, but an increase of the total solids is evident if the twenty-four-hour urine be examined.

When the urine is decreased and there is a normal amount of fluid ingested, apart from acute or chronic nephritis one thinks chiefly of a weak heart, hepatic cirrhosis, pressure or obstruction affecting the renal circulation, or of excessive perspiration and fever. If the kidney be sound, the specific gravity will, in such cases, be increased.

As a matter of fact, so far as the average life-insurance examination is concerned, the question of increased or diminished total amount seldom assumes much importance.

"Frequency of micturition?" "Does the applicant rise at night to pass urine?"

The first question is generally a poser for the applicant, and

he may hazard a guess varying from "two" to "six or eight" times in the twenty-four hours.

The question as to rising at night is, in the author's opinion, very important. If, as happens occasionally, the answer be an affirmative one, it is usually accompanied by the statement that it is purely a habit. This, of course, may sometimes be true, but in a large proportion of such cases the presence of stricture, an enlarged or inflamed prostate, gravel, diabetes, genito-urinary tuberculosis, or an interstitial nephritis is to be held accountable, and microscopic examination should be the invariable rule.

An important question.

It must also suggest the necessity for looking for *Tripperfäden* in the specimen passed, and often justifies and requires the use of the sound or an examination of the prostate per rectum. Such extraordinary procedures are, however, best left for subsequent action contingent upon a request from the home office. In all such cases the examiner should make a most critical study of the pulse, heart-sounds, and cardiac area for evidences of the circulatory changes of an interstitial nephritis. Not infrequently the drinking of large quantities of water or other less objectionable fluids at bedtime may account for the condition, or, as before stated, it may, *in the rarest instances*, be a lifelong habit. It sometimes furnishes important collateral evidence of insomnia, as the man who lies awake at night almost invariably rises once or twice to pass urine. In all such cases, therefore, the applicant should be questioned upon this point.

"Habit."

Insomnia suggested by "rising at night."

THE REACTION.

The reaction may be acid, alkaline, or amphoteric, and when practicable, the examiner should procure other specimens if alkalinity be evident, and satisfy himself as to whether the condition is temporary or permanent. *In every case the question as to whether the alkali be fixed* (potassium or sodium) *or volatile* (ammonia) *is important.* To decide this, one has only to add a few drops of sodium or potassium hydrate to a small amount of the urine and boil it, when, if the alkali be volatile, the odor of ammonia will at once be detected.

Kind of alkalinity must be specifically stated.

A still simpler method consists in allowing the wetted test-paper to dry in the air, a resumption of the original color proving the presence of the volatile alkali. The odor of urine,

if acid, is in itself quite distinctive, and the same is true of frankly ammoniacal urine. For insurance work, however, the litmus paper should always be used.

The alkaline tide.

The alkaline reaction may be purely physiologic two or three hours after a meal (the alkaline tide), or one may be dealing with a vegetarian, in which cases the alkali is fixed and the condition unimportant; but persistent alkalinity, unless purely dietetic, is abnormal, hence the necessity for a careful inquiry into the condition causing it. *In no case should an alkaline reaction be reported to the home office without a positive statement as to the nature of the alkali present.*

WHAT IS THE SPECIFIC GRAVITY?

The actual process is so simple that one finds it hard to understand why so many errors occur in the determination of specific gravity, and its importance is so great as to make it difficult to believe the statement so frequently made that certain examiners almost wholly neglect it, merely putting down any figure that is within the normal limits. Such carelessness, if it exist, is unpardonable.

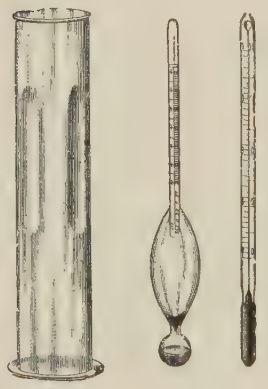


FIG. 76.—URINOMETER, THERMOMETER, AND SPECIFIC-GRAVITY TUBE ON FOOT.

The following are the only requisites:

First, the urine must be allowed to cool, or a proper allowance made for high temperature as determined by an accurate thermometer.

The standard temperature of the urinometer should be noted. The urinometer is usually graduated for a temperature of 15.5° C. (60° F.), and for every three degrees (Centigrade) of heat above that figure one degree must be added to the specific gravity. Thus a freshly passed urine might give a temperature of 90° F. and yield a specific gravity several points below the true figure.

Second, all air-bubbles should be removed from the surface. This is easily done with a bit of filter-paper. Albuminous urine is, as a rule, very foamy, the degree depending upon the percentage of albumin present.

Third, a reliable urinometer of standard make should be gently placed in the urine so that it does not touch the sides of the glass. A special tube on foot for this purpose is very convenient.

Fourth, the specific gravity should be read from the meniscus, or true surface, the observer's eye being on a level with the upper border of the liquid. When one looks down upon the surface a false reading is obtained because of the capillary attraction exercised by the stem of the urinometer.

Fifth, if the amount of urine obtained be too small to freely suspend the urinometer, the observer, after reserving a small portion for chemical and microscopic examination, should add an equal amount of distilled water, and double the two last figures of the specific gravity thus obtained.

Sixth, if the urine show a density under 1012 or over 1028, the examiner should inquire carefully as to the cause, remembering that Bright's disease is suggested by abnormally light, and diabetes by exceptionally heavy, urines. In such cases it is always best to secure another specimen before forwarding the report. *The examiner is expected, moreover, to report the result of all examinations, and not the most favorable only, as is too often the case.*

All tests made should be reported.

The Urinary Solids.—These are not ordinarily determined in life-insurance examinations. The total amount of solids in the urine should equal 60 to 70 gm. daily upon ordinary diet, or 30 gm. on a fever diet. The amount of solids per 1000 c.c. is readily shown (approximately) by using the coefficient of Trapp, 2.00, or of Haser, 2.33, as a multiplier, and the last two figures of the specific gravity as the multiplicand: *e. g.*, sp. gr. 1020: $20 \times 2 = 40$ gm. per 1000 c.c. Total urine for twenty-four hours, 1500 c.c.: 40×1.5 equals 60 gm. Of this total, nearly one-half is urea, but it is essential that this should be estimated separately and accurately, for it measures more closely than any other factor the progress of the disease.

TRANSPARENCY.

The total urine passed in twenty-four hours should, if properly collected and preserved, be perfectly clear save for a slight nebula, due to mucus, that floats in the upper portion of the liquid. In

Turbidity due to phosphates or urates.

such specimens as are passed at the time an insurance examination is made, it often happens that the earthy phosphates or the amorphous urates cause a sediment purely physiologic in character. *Phosphates are usually present in the feebly acid, neutral, or alkaline urine when it is passed. Urates appear in acid urine as it cools.*

Effect of heating.

Heating such urines causes an increased precipitation if the substance be phosphatic, and dissipates the turbidity if it be due to urates.

Without doubt many unjust rejections have been made because phosphates were reported as albumin or urates as pus. Such mistakes can not occur if the specimen be treated first with acetic acid, which removes the phosphates, and is then brought to the boiling-point, for before this temperature is reached all urates will have disappeared. *A mineral acid dissolves phosphates, and heat brings about the solution of urates.*

Persistent opacity.

Persistent opacity or turbidity, if due neither to phosphates nor urates, is pathologic, and may be caused by pus, blood, fat, or bacteria. These substances will be further considered in another section. (See Pus, Blood, Bacteria.)

COLOR.

Normal urine, freshly passed, may vary in color from pale yellow to yellowish-red, and all, whether normal or abnormal, admit of a general division into pale, normal, high-colored, or dark urines.

Relation of color to specific gravity and reaction.

Deep color is usually associated with relatively high specific gravity and marked acidity, and pallor with low specific gravity and lessened acidity, or even alkalinity, diabetes mellitus furnishing an exception to the rule. Indeed, so striking is the heavy weight of diabetic urine, taken in connection with its light color, that a provisional diagnosis is often suggested upon lifting the tube or bottle containing the specimen, before any other test is applied.

Fever.—Febrile urines are not likely to be met by the insurance examiner. They are invariably high colored and of high specific gravity, containing large amounts of normal and abnormal coloring-matters.

Drugs.—Various drugs may intensify or modify the urinary

tints. Orange and reddish-brown urines may owe their color to senna, rhubarb, or chrysophanic acid, and this tint may be so deep as to suggest blood. Two simple tests usually suffice to prove the presence of a drug: *Add to a small portion a mineral acid and a yellow color results, to another an alkali and the result is a blood-red solution.*

Test for drugs in urine.

Bile.—*Greenish, yellowish-green, or greenish-brown urines* may be due to bile; if so, the foam produced by shaking the liquid is yellow. Urine containing bile may, when freshly passed, be reddish-brown, but oxidation of the brown bilirubin converts it into biliverdin and produces the greenish tinge.

Brown, black, smoky, or red urines suggest:

(*a*) *Blood.* — Color: red, reddish-brown, smoky, brown, black.

(*b*) *Melanemia* (Melanotic Sarcoma).—Urine becomes black on standing. It does not reduce Fehling's solution or other alkaline solutions of cupric sulphate.

(*c*) *Alcaptonuria.*—Urine becomes black on standing. It does reduce Fehling's solution.

(*d*) *Poisoning by Coal-tar Products.*—Greenish-black color due to hydroquinone. Follows the excessive administration of drugs like carbolic acid, naphthalin, guaiacol, resorcin, salol, creolin, and lysol.

(*e*) *Hematoporphyrin.*—Color of port wine or Bordeaux.

Blue Urines.—Usually seen in cases of excessive formation and elimination of indoxyl products, or the administration of methylene-blue. In ileus, cholera, and typhus indican is present in large quantities.

Milky Urine.—Such an appearance is due to pus or to fat.

Pus forms a sediment, and is easily detected by the proper chemic and microscopic tests.

Fatty urine may merely show fat droplets on the surface, as in extreme fatty degeneration of the kidney, or in cases where vaselin or oil has been applied to the urethra; or a true chyluria may be present.

Chyluria.—This condition is rare and almost pathognomonic of the filaria sanguinis hominis. The urine appears like milk, and the emulsion is so perfect that no fat droplets can be detected under the microscope.

Tests for Fats.—The microscopic or macroscopic examination suffices in ordinary cases.

Chemic Test.—Add potassium hydrate and ether, shake, decant, and evaporate the supernatant fluid. The fat is taken up and held in solution until released by evaporation of the ether.

Fibrinuria.—In rare instances, as in some cases of villous growth in the bladder, the urine jellies upon standing, or, if less fibrin be present, a curious sticky sediment may adhere to the bottom of the glass.

INDICAN (INDOXYL).

This normal urinary chromogen is extremely interesting to the clinician, but has not yet been applied to life-insurance work. In general it may be said that this substance results from albuminous putrefaction, but only in the presence of bacteria.

Test (Jaffé-Stokvis).—(*a*) Take equal parts of the urine and strong hydrochloric acid. (*b*) Add two or three drops of a saturated solution of sodium or calcium hypochlorite, or of common saltpeter. Shake. Add 1 c.c. of chloroform, shake thoroughly, and set aside. The chloroform then shows a depth of color varying with the amount of indican present. Simon advises that very dark or bile-containing urines should be treated with a solution of lead acetate. Potassium iodid may act as a disturbing factor. The amount of indican is roughly estimated from the depth of the color shown, and the observer should establish a standard by repeated observations in the normal subject, using, in all cases, exactly the same quantities of urine and reagents.

Cases Showing Marked Increase of Indican.—Ileus; carcinoma ventriculi; peritonitis (acute and chronic); emphysema; any chronic suppuration with absorption; chronic appendicitis; gastric ulcer; acute, subacute, and chronic gastritis.

C. E. Simon has pointed out its interesting and important association with hypo- and achlorhydria; also the curious fact that a similar increase accompanies the hyperchlorhydria of gastric ulcer, and that simple constipation does not produce it.

Investigations in this direction are full of promise for the future.

ALBUMINURIA.

"Does the urine contain albumin?"

The medical examiner must bear in mind three cardinal points:

Three cardinal points.

First, that normal urine does not contain a sufficient amount of albumin to respond to ordinary clinical tests. Albumin in the urine is distinctly pathologic.

Second, that the presence of albumin does not necessarily mean that the person passing the urine has Bright's disease.

Third, that the absence of albumin in the urine does not prove that a person is not suffering from Bright's disease.

To explain the first statement, it need only be said that nearly all reports of albumin in normal urine have been based upon chemic tests of extreme delicacy applied to urines highly concentrated by evaporation.

Extrarenal albuminuria.

As to the second, albumin may enter the urine through many extrarenal channels. A leukorrheal discharge, a gonorrhea,—in fact, a purulent or bloody discharge from any portion of the urethra, prostate, bladder, ureters, or renal pelvis, or from fistulous openings entering these organs,—must of necessity cause albuminuria, for the reason that both pus and blood are distinctly albuminous, and will give up a portion of their albumin to the urine.

May be absent in interstitial nephritis.

The facts attesting the truth of the third proposition are beyond denial. It is positively known that in cases of chronic interstitial nephritis albumin may be entirely absent for long periods.

Albuminuria defined.

Albuminuria, in the clinical sense, means serum albumin in solution in the urine, serum globulin being, as a rule, an associate product.

Nucleo-albumin and mucin.

That curious substance known as nucleo-albumin and the urinary mucin are present in all urines, and may in rare instances interfere to a certain extent with the tests ordinarily used to detect albumin.

We need not concern ourselves with the theories that have been advanced to explain renal albuminuria, nor need we make any attempt to discuss the albumoses and other urinary proteids that are better described in works devoted to physiologic chemistry and clinical diagnosis. Suffice it to say that, under

Any plasma proteid may appear in the urine.

certain conditions, any or all of the proteids found in blood plasma may appear in the urine.

The Significance of True Albuminuria.—Osler happily says, in his work on "Practice": "The presence of albumin in the urine in any form and under any circumstances may be regarded as indicative of changes in the renal or glomerular epithelium, a change, however, *which may be transient, slight, and unimportant*, depending upon the variations in the circulation or upon irritating substances taken with the food, or temporarily present, as in febrile states."

"Functional" and "cyclical" albuminuria.

Such a statement aptly covers the whole subject of functional and true albuminuria. It must be admitted that albuminuria *may* follow emotional disturbances, violent exercise, cold baths, and the ingestion of excessive amounts of nitrogenous foods, or it may accompany infections of various kinds. In young persons cases may occur in which the albuminuria is intermittent or occurs at definite intervals (cyclical), the usual general and circulatory symptoms of Bright's disease being absent.

All these statements being true, the vital question for the insurance examiner still remains, and may be thus stated:

The vital question.

Is an albuminuric person insurable? If so, upon what plan? and how may the question of relative risk be determined?

As certain American insurance companies are leaning toward the English point of view, which sees a possibility of insuring almost every applicant, provided a proper premium can be collected, Dr. Osler's advice, that all persons actually suffering from true albuminuria be rejected, must be applied only to those seeking insurance upon the ordinary plan. Rejection must certainly be the rule in every such case, however slight the albuminuria. The question of insurability under special plans and upon special terms will be considered in the chapter devoted to the Insurance of Substandard Lives.*

Albuminuria always impairs the risk.

Remote albuminuria.

Those who have had albuminuria—such as, for example, a scarlatinal nephritis, or one produced by exposure—are insurable upon the ordinary plan if the date of illness be very remote, and if the applicant were young at the time of its occurrence, and made a prompt and complete recovery. The family history and

* See Insurance of Substandard Lives.

the condition of the heart and blood-vessels must in such cases be above suspicion.

The Test for Albumin.—The essentials of a good test for albumin are : Essentials of a practical test for albumin.

(*a*) *Simplicity.*

(*b*) *A reasonable degree of delicacy.*

(*c*) *Decisiveness.*

It should remove to the greatest possible degree any chance for misinterpretation or confusion. In short, for insurance purposes a test should be chosen not alone for *delicacy*, but for the exactness of its findings, and must protect both the insuring company and the applicant.

It can not be too emphatically stated that *the heat and nitric acid tests as they are usually applied do not fulfil these requirements.* Sources of error in older tests.

Boiling the urine precipitates albumin, nucleo-albumin, and phosphates.

Nitric acid precipitates albumin, mucin, nucleo-albumin, urea, acid urates, resins, if present, and the primary albumoses. Nearly all of these substances appear in small quantities, but may mislead the examiner in cases where slight albuminuria is present or suspected. Furthermore, the careless application of Heller's test (the contact test) produces a ring of urinary coloring-matter most interesting and instructive, certainly, but likely to obscure a faint haze or ring due to a trace of albumin.

As practically no waste of time is therein involved, the author would earnestly advise that the exact technic outlined below be carefully followed in order that error may be reduced to the minimum.

It should be borne in mind that when a test for albumin is properly made, any haziness or opacity is abnormal. To detect haziness, the urine should be held *toward* the light, with the coat-sleeve for a background. If held directly against the source of light, even a well-marked albumin ring or haze may be overlooked. To detect opacity.

The urine must be absolutely clear before any test for albumin is applied.

TESTING FOR ALBUMIN.

(*a*) Add acetic acid.

First step: To a portion of the urine submitted for examination add two or three, but *not more than five or six*, drops of acetic acid (50 per cent.).

(*b*) Filter.

Second: filter until absolutely clear. A single filtration usually suffices; if not, the cloudiness is probably due to bacteria, which pass readily through ordinary filter-paper. They may be easily removed by adding barium carbonate, shaking, and filtering.

(*c*) Divide in two portions.

Third, set aside a portion of the filtered urine for comparison.

(*d*) Add saturated salt solution.

Fourth, add to the remaining urine one-sixth of its volume of a saturated aqueous solution of common salt.

Boil and compare with other portion of filtrate.

Fifth, boil and compare with the unheated specimen, holding both to the light, as previously recommended. Any precipitate or cloudiness is due to serum albumin. The amount of time ordinarily involved is trifling, and the test is extremely definite and delicate.

The only agents required are: (*a*) acetic acid (50 per cent.); (*b*) a saturated solution of common salt.

The Contact Test.—Place in a conical glass or test-tube about a dram of pure nitric acid, and with a pipet allow the urine to gently flow down the side of the glass and upon the surface.

Proper method.

If the mouth of the pipet be placed against the side of the glass, just above the level of the acid, and a very gentle flow established, the result is extremely clean-cut and beautiful. Albumin, if present, appears as a band or ring at the junction of the two fluids, more or less distinct in proportion to the amount of albumin present. *The tube or glass should be set aside*, as several minutes may be required to develop the reaction.

Urinary coloring-matters appear near the surface of the acid, but usually at a point just below the albumin ring, if the test has been properly made. If within ten minutes, there appears another ring resembling albumin, but at a distinctly higher level; one may assume that a relative excess of uric acid or acid urates is present, or that the individual from whom the urine was received has fever.

Affords basis for rough estimate of urea.

According to the statement of C. E. Simon, the subsequent appearance of a film like hoar frost on the sides of the glass indicates that about 25 gm. of urea are contained in a liter

of the urine under examination. Similarly, spangles of this urea nitrate point to 45 gm., and the separation of a dense mass to 50 or more grams to the liter. It must be remembered that such deductions are not of much value unless the specimen under examination be a part of the collected urine for twenty-four hours, and in insurance work this is rarely the case. Mucin, if present in excess, may form a light cloud in the upper portion of the urine, and resins may also be precipitated, but are known by their immediate disappearance when a portion of the cloudy urine is withdrawn by means of a pipet and shaken with alcohol.

Mucin and resins.

If space permitted, much that is of interest might be said of the urinary chromogens and pigments. If one wishes to study them, the urine should be placed in the glass and the acid poured rather briskly down the side. When this is done, the coloring-matters are prominently displayed, and the albumin ring, if present, is raised to a level that nearly corresponds to that of uric acid and acid urates, when the test is applied by the first method.

Coloring-matters.

The heat and the nitric acid tests thus applied are excellent, and quite sufficient for ordinary purposes. Of the two, the heat test is the more definite and positive. On the other hand, the so-called "heat and nitric acid test" so generally used and recommended is fallible and misleading. The reader will remember that this method consisted in adding nitric acid drop by drop while boiling the urine. The following errors may then occur:

The old "heat and nitric acid test" fallacious.

A small amount of albumin treated with an excess of acid may form a soluble acid albumin and escape detection; on the other hand, in an alkaline or neutral urine, with phosphates present in excess, a failure to sufficiently acidify the specimen may result in the formation of a soluble alkali albuminate. Neither acid nor alkali albuminates are precipitated by subsequent boiling. Furthermore, according to Purdy, mucin, globulin, and albumoses are precipitated by this method. The author recently saw a case in which a specimen of urine containing 0.25 per cent. of albumin was reported normal after the application of this test.

Sources of error.

Illustrative case.

One other beautiful test may be mentioned:

The Potassium Ferrocyanid Test.—Into a clean test-tube pour *a dram or two* of acetic acid (50 per cent.); to this add twice its volume of an aqueous solution of potassium ferro-

cyanid (1 : 20). Shake the mixture, and overlay with the suspected urine as is done in the contact test with nitric acid.

Albumin, if present, appears at once as a band or ring at the junction of the two fluids. *It is essential that the full amount of acetic acid be added*, otherwise even a considerable amount of albumin will escape detection.

Quantitative Tests for Albumin.—Two simple tests suffice for the quantitative estimation of albumin. The first demands the use of Esbach's albuminometer; the second requires a centrifuge. Both tests are extremely simple in execution, and as no physician's office is complete without a centrifuge, and as the Esbach's tube is inexpensive and easily obtained, no hardship is involved in their application.

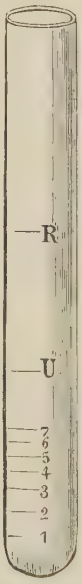


Fig. 77.

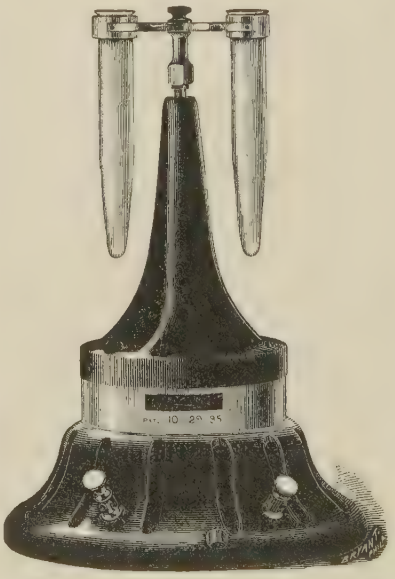


Fig. 78.

Esbach's albuminometer.

Esbach's albuminometer is merely a glass tube graduated and lettered as shown in figure 77. This tube is filled to the letter U with urine, and a solution of picric acid (picric acid, 10; crystalline citric acid, 20; aquæ dest., 1000) is added until the level of the liquid has reached the letter R. A rubber stopper is then inserted, and the tube is inverted several times to thoroughly mix the urine and test

solution. The tube is then set aside from twenty-four to forty-eight hours. The albumin is precipitated, and its height, measured by the numerals upon the scale, represents in grams the amount of albumin present in one liter (1000 c.c.) of the urine.

If the urine is concentrated or contains an unusually large amount of albumin, it is best to dilute it with an equal volume of water and double the result. In fact, the best results are obtained by diluting any urine until the specific gravity is at or below 1008.

This method is sufficiently accurate for practical purposes, although peptones, mucins, etc., if present, are precipitated together with the albumin. It is slow, however, and far inferior to Purdy's direct method of testing by means of the centrifuge.

Inferior to centrifugal method.

Centrifugal Method.—Fill the graduated tube supplied with the centrifuge with urine to the mark 10 c.c. Add 3 c.c. of a 10 per cent. solution of potassium ferrocyanid, and 2 c.c. of acetic acid (50 per cent.). Mix and thoroughly revolve in the centrifuge until the supernatant fluid is clear and the albumin evenly deposited at the bottom of the tube. Each mark represents $\frac{1}{10}$ c.c., and corresponds to a bulk measure of 1 per cent.

Purdy's method.

The old-fashioned methods of estimation, by boiling the urine in a test-tube, or of judging the amount by the depth of the ring produced by the contact test with nitric acid, are useful, but not sufficiently accurate, and introduce too much of the personal equation. On the other hand, the very exact methods of the chemical laboratory are laborious, and demand more time than the busy insurance examiner can give.

CHRONIC INTERSTITIAL NEPHRITIS.

This disease is the *bête noire* of life-insurance examiners, and a few words concerning it will not be out of place in this chapter.

The examiners' *bête noire.*

The insurance agent is not apt to bring before his physician an applicant who suffers from any of the ordinary forms of kidney disease. Acute Bright's is out of the insurance question; chronic parenchymatous nephritis flies its signals so plainly in the pallid face and puffy eyes of its victim as to make unnecessary in most instances an investigation of the frankly albuminous, cast-filled urine.

It is quite otherwise with the man who has a contracted

Deceptive appearance.

kidney. Robust, full-blooded, rosy, and genial, he may appear to the insurance solicitor the embodiment of health and good spirits, and it needs the shrewd eye of the medical man to note the puffy lower lid and the overfilled capillaries, and his skilled hand and ear to discover the telltale hypertrophy of the left ventricle, the high-tension pulse, and the accentuated aortic second sound.

Characteristic signs.

In chronic interstitial nephritis we meet with a disease that in clinical signs is the antithesis of the parenchymatous form. It is usually characterized by an insidious onset, early increased tension and stiffened vessels, accentuated aortic second sound, ultimate hypertrophy of the left ventricle, the passage of large amounts of urine of low specific gravity, poor in albumin and containing a few hyaline and granular casts. The disease is distinctly one of middle age, death occurring most commonly between the ages of fifty and sixty.

Diagnosis difficult.

Often unrecognized as a cause of death.

If one refer to the pathology of the disease, he can readily understand why it is invariably well advanced before attention is drawn to the kidneys as the source of trouble. *In no disease is an early diagnosis more important, and in none more difficult.* A large number of cases die with the disease unrecognized ; in many others a violent outbreak of uremia is the first definite evidence of the disease. A knowledge of the existence of etiologic factors in connection with the social, family, and medical history of the patient is of great assistance in making the diagnosis, but the physician's chief reliance in insurance work must be placed upon the careful and scientific interrogation of the circulatory organs and the urine.

High-tension pulse.

Aortic accentuation.

Polyuria.

Albumin and casts.

Left ventricular hypertrophy.

Cardinal Points.—As before stated, there is in this disease a general increase in arterial tension, which in a majority of cases early makes itself evident in a firm pulse and rigid artery, an accentuated and ringing aortic second sound, with, possibly, a duplicated first sound at the apex. If coincident with this one finds frequent micturition, an increased total amount of urine of low specific gravity, with perhaps only a trace of albumin and an occasional granular and hyaline cast, he may safely make his diagnosis, and will then be able to do much to delay the development of the terminal stages of marked left ventricular hypertrophy going on to dilatation.

General Symptoms.—Aside from the foregoing phenomena and the development of uremia, there may be few symptoms or none. Dyspepsia is usually present; indeed, it may be said to be an almost invariable accompaniment. Headache, vertigo, and disturbances of vision are common as early or late symptoms. The diagnosis is oftentimes first made by the oculist, who, while examining the fundus, recognizes the characteristic flame-shaped hemorrhages, papillitis, edema of the retina, or the peculiar fawn-colored patches radiating from the macula lutea. Edema in this form of disease, if present at all in the first stages, is trifling and transitory, being peculiarly liable to capriciously shift its seat. In the last stages it is simply the edema of dilated heart. Only in some of the *advanced* cases is a more or less characteristic physiognomy established, the eyelids being puffy and the complexion assuming a peculiar fawn color. The difference in the appearance of the eyelids as between morning and evening is often very striking. Upon arising, the lower lid is tensely distended, while in the afternoon or evening it may be empty, the delicate skin falling into fine, deep wrinkles.

Dyspepsia, headache, vertigo, insomnia.

The fundus oculi.

Edema.

Physiognomy.

Urine.—In the large white kidney the daily amount of urine falls usually below the normal 1200 c.c. In secondary or true contracted kidney it is much increased, not infrequently reaching or exceeding 4000 c.c. It is worthy of notice that the increased frequency of micturition so characteristic of interstitial nephritis is often so gradually developed as to excite no alarm, the patient attributing it to his increased ingestion of fluids, or regarding it as a mere habit. Of especial significance is the large amount of night urine as compared with that of the day, the normal ratio being reversed.

An increased flow of urine of continuous low specific gravity is characteristic of contracted kidney, whether secondary or true interstitial, as long as compensation is maintained. In interstitial nephritis with a failing heart one expects a scant urine of comparatively high specific gravity, varying within wide limits. But even in such cases *the total solids for twenty-four hours will be greatly diminished. One has chiefly to fear in any case a sudden and considerable decrease.*

Urinary solids diminished.

Achard and Castaigne have suggested the hypodermic use of methylene-blue as a means of determining the question of renal

Renal permeability as determined by use of methylene-blue.

permeability, and Cabot has reported * interesting and valuable results obtained by the administration, by the mouth, of small doses (¾ gr.) of the drug.

In cases of interstitial nephritis the urine remains unaffected for three hours or more, and the drug requires weeks for its complete elimination.

In normal kidneys, or in such as are the seat of acute or chronic parenchymatous changes, the characteristic greenish or bluish tint appears in a comparatively short time,—one to two hours,—and entirely disappears within three or four days.

The test needs further and more extended study, but is full of promise, and might easily be applied to those doubtful cases which so perplex the conscientious examiner.

SUGAR IN THE URINE.—GLYCOSURIA.

Clinical Definition.—*Glycosuria, in a clinical sense, includes any and all conditions under which the urine contains grape-sugar (glucose) in quantity sufficient to respond to the ordinary tests. In short, all diabetics have glycosuria, but all who have glycosuria are not diabetics.*

Glucose the constituent.

Sugars of various kinds may be found in the urine, but glucose is the only one of especial interest to the examiner. Normal urine contains it, as it does albumin, but not to an extent that can produce any confusion in clinical work; hence any urine that shows sugar when tested according to methods here recommended is abnormal. It is true that glucose or dextrose may appear either persistently or intermittently in the urine of persons who are apparently in perfect health, and, as in the case of albuminuria, many attempts have been made to draw a sharp line between the benign and the pathologic process and separate simple glycosuria from diabetes mellitus.

"Physiologic" glycosuria.

But, unfortunately, the term glycosuria must be held to cover any and all cases in which sugar appears in the urine, either intermittently or permanently, in large or in small quantities, and no division save that suggested by Stengel is practicable. This writer very aptly says that all attempts at elaborate classification finally resolve themselves into a simple division—viz.: cases easily

Glycosuria *vs.* diabetes.

* Cabot and McGirr, "St. Paul Med. Jour.," Feb., 1899.

controlled are labeled "simple glycosuria," whereas those that are intractable are called diabetes mellitus.

This is putting the present situation in a nutshell. One may admit that a man who eats heartily of glucose on a fasting stomach, or takes quantities of phloridzin, or suffers brain injury or great mental shock, may have a temporary and comparatively unimportant glycosuria. It is also known that sugar in the urine of a recently delivered woman is unimportant; but nothing save the lapse of time can assure us of the benign nature of any given case. Glycosuria may entirely disappear for long periods, only to recur, and not infrequently to assume a malignant form. Such periods of latency can not be justly estimated, and the very causes that are assigned for benign glycosuria are quite commonly associated with the development of diabetes mellitus.

"Physiologic" glycosuria treacherous.

The less said about the *causes* of glycosuria the better, our present knowledge being indefinite and unsatisfactory. The conditions under which it develops are, in brief, the following:

Predisposing conditions.

Age.—It occurs at all ages, but chiefly in the fifth and sixth decads. Its prognosis is inversely as the age of the individual. Children rarely recover, and in them the course may be astonishingly acute.

Sex.—Eighty per cent. of the cases occur in males.

Race.—Certain races suffer greatly from the disease. In Tunis and in Malta its ravages are comparable to those of tuberculosis in European countries. This, however, applies chiefly to city dwellers. Hebrews are especially liable to the disease. An enormous increase has been noted in certain cities during the last three decads. In Danish cities and in Paris, for example, the mortality is said to have quadrupled during that period. Due allowance must, of course, be made for improved diagnostic methods.

Heredity is very marked. Schmitz reports that diabetes had occurred in the blood relations of 998 of the 2115 individuals whose cases he had investigated, fourteen cases having been reported in one family.

Diet.—Digestive glycosuria is, under certain conditions, quite unimportant. Van Noorden would place a definite limit to the amount of sugar that should be disposed of under normal conditions without producing glycosuria, and various writers have

suggested a test amount varying from 100 to 250 gm., this to be taken at one sitting and on a fasting stomach. If sugar then appears in the urine, the individual is a suspect. It is said that in such cases the sugar excreted is of the same variety as that ingested.

Exercise.—There can be no doubt that a rich diet, associated with sedentary habits and great mental activity, are potent factors in causation.

Gout.—Gout is distinctly associated with diabetes, though it is claimed that the arthritic form is comparatively benign. The reason for such an association is evident, the same habits of life and hereditary element being present in both diseases. It should be noted, however, that the consumption of alcohol is not often a prominent factor in the causation of glycosuria.

THE EXAMINER'S DUTY.

The insurance examiner must regard all cases of glycosuria with suspicion, enter carefully into the question of heredity, diet, habits, and general health, estimate the amount of sugar present, and, if required by the home office, make repeated tests.

DIABETES MELLITUS.

Definition.—*Diabetes mellitus may be defined as an intractable and constant glycosuria associated with serious general symptoms and marked impairment of the health.*

When typical, it offers one of the easiest of diagnostic problems, the association of glycosuria with emaciation and "the three P's" (polydipsia, polyphagia, and polyuria) being absolutely diagnostic.

The following points must be borne in mind:

Important departures from the type.

1. The urine in glycosuria and diabetes mellitus is not invariably of high specific gravity. Cases have been reported in which a specific gravity under 1010 was present, and 1015 is far from uncommon.

2. Polyuria is not invariable even in true diabetes mellitus.

3. Polyphagia and polydipsia may be absent for long periods.

4. At certain times of the day sugar may be entirely absent from the urine of a diabetic.

Latency.

5. Long periods of latency occur in certain cases of true diabetes.

Age and build.

6. In general it may be said that glycosuria is less serious in the obese than in the lean, and that cases in persons beyond middle age permit one to make a more favorable prognosis than would be possible in the case of a younger person.

"Prepared" applicants.

7. Even in true diabetes special diet and preparation may entirely remove the sugar from the urine, and the examiner must therefore be wary in recommending for insurance any supposedly cured diabetic.

ACCEPTANCE OF RISKS PRESENTING GLYCOSURIA AS A SYMPTOM.

Usually glycosuria in the individual constitutes a bar to acceptance. Indeed, it may be said that, save under considerable premium additions or a lien, no acceptance of a case in which glycosuria is present can be considered. If, however, some years have elapsed, during which the urine has been absolutely normal and the general health perfect, the case may be considered upon some more favorable plan. In such instances a lack of any history of family gout, diabetes, or nervous affections would favorably affect the risk. (See Substandard Lives.)

Tests for Glucose in Urine.—All clinical tests for glucose in solution depend upon the following properties:

Fundamental principles.

(*a*) *The fact that when brought into contact with certain oxids, as, for example, those of copper and bismuth, it becomes oxidized at their expense—i. e., acts as a reducing agent.*

(*b*) *Its ready fermentability.*

(*c*) *The fact that it is dextrorotatory.*

Trommer's, Fehling's, and Haines' tests.

The Copper Tests.—The well-known Trommer's test has been superseded by better and more accurate methods, but Fehling's solution is so widely used as to require a description of the test. This solution is distinctly inferior to Haines' modification, and is so unstable that it must be kept in two parts and mixed whenever needed for use.

Remove albumin.

Fehling's Test.—*Directions.*—All albumin should be removed by boiling and subsequent filtration. Pour into a test-tube one finger's breadth each of the following stock solutions:

Mix equal parts of solutions A and B.

Solution A is made by dissolving 34.64 gm. of pure, dry, powdered copper sulphate in 200 c.c. of warm distilled water. Distilled water is then added to bring total quantity up to 500 c.c.

Solution B.—Dissolve in 300 c.c. of hot water 180 gm. of

Rochelle salt. Filter. Add of pure caustic soda 70 gm. Cool and add distilled water enough to make 500 c.c.

Solution *A* is light blue.

Solution *B* is white or colorless.

When equal parts are mixed, a deep-blue solution results.

Heat to boiling-point, adding urine drop by drop.

Heat the portion mixed in a test-tube to boiling-point, and add drop by drop the suspected urine until a reaction is produced, or an amount equal to but not exceeding the volume of the original solution is reached.

Typical reaction.

The Reaction.—The reaction for sugar consists in a greenish-yellow turbidity, changing to bright yellow, orange, and red. *This may appear only after the test-tube has stood for some time.* A muddy greenish turbidity is often produced by substances other than glucose.

Objections to Fehling's Solution.—Fehling's solution as ordinarily prepared is open to serious objections:

(*a*) It is unstable.

(*b*) An excess of glucose obscures the terminal reaction by becoming caramelized by long boiling.

(*c*) It can not be directly applied to ammoniacal urine unless such a urine be especially prepared.*

(*d*) A large number of substances may reduce its cupric oxid. Such are glycuronic and glycosuric acid, alkaptone, creatinin, uric acid, and various drugs, such as benzoic acid, chloroform, chloral, glycerin, the salicylates, turpentine, etc. *Hence if one uses Fehling's solution for qualitative work, he must bear in mind that it is more valuable as a negative than as a positive test.* In other words, a urine that does not reduce Fehling's solution is free from glucose, but reduction does not conclusively establish its presence.

Haines' test.

Haines' Solution.—A much simpler and better copper solution is that of Haines. It is made as follows:

Formula:

Pure copper sulphate,	30 grains
Distilled water,	1 oz.
Make a perfect solution and add:	
Pure glycerin,	½ oz.
Mix thoroughly; add:	
Liquor potassæ,	5 oz.

* To prepare an ammoniacal urine for the sugar test with Fehling's solution, boil, adding potassium hydrate solution until the fumes of ammonia cease to rise.

Application of Test.—In using Haines' solution the amount taken is boiled gently in a test-tube, and the urine is added drop by drop until *six* or *eight drops* have been added. If, after boiling for a moment, the yellow, orange, or red precipitate does not appear, sugar is absent. *No more than eight drops of urine should be added, and the boiling should be gentle and not unduly prolonged.* This solution keeps indefinitely. Technic.

Allen's Test.—Before leaving the copper tests it might be well to mention that of Allen. This is said by Hutchison and Rainy to have the following advantages: Sugar test applicable to albuminous urine.

(*a*) Albumin need not be removed.

(*b*) Uric acid, creatinin, and like substances do not affect the reaction.

The test derives its value from the fact that acid solutions of sodium acetate precipitate the interfering substances without removing or affecting any glucose that may be present.

Test.—In a perfectly clean test-tube heat 8 c.c. of urine to the boiling-point. Pay no attention to any precipitate (albumin). Add 5 c.c. of the solution of copper sulphate used in making Fehling's solution (solution A as described). Cool partly. Add 2 c.c. of a saturated solution of sodium acetate that has been rendered *faintly* acid by *acetic* acid. Interfering substances are now precipitated. Filter and add to the clear filtrate 5 c.c. of the solution B used in making Fehling's solution. Boil twenty seconds. If sugar is present, the solution becomes opaque and green, and deposits, either immediately or after standing a few minutes, a fine yellow precipitate.

The tests already given are placed in the direct order of their convenience and rapidity, but the inverse order of accuracy. Yet error will seldom occur if every sugar reaction be *checked* by the one accurate test for glucose, namely—

The Fermentation Test.—*This test depends upon the fact that glucose is a fermentable substance, and practically the only one that urine ever contains.*

The Test.—The most convenient apparatus is that of Einhorn. (Fig. 79.) Each step in the process should be checked by comparison with a normal urine; therefore two tubes are required. If Einhorn's saccharometer is not to be had, the Doremus ureometer tubes will answer the purpose.

Caution.

(*a*) Boil the two specimens for several minutes to drive off any air they may contain.

(*b*) Add to each a pinch of tartaric acid in order to maintain their acidity and prevent ammoniacal decomposition.

(*c*) Dissolve in each the same amount of German yeast (about one-sixth of a fresh yeast cake is sufficient). If there be any doubt as to the freshness of the yeast, it is well to test it with a solution of glucose.

The long limb of the fermentation tube of the saccharometer

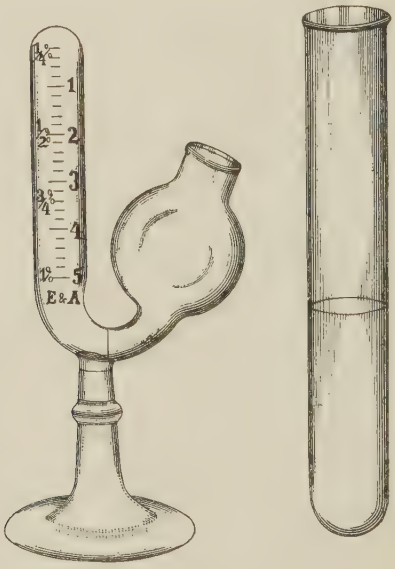


Fig. 79.—Einhorn's Saccharometer.

or of the Doremus ureometer is filled with the urine, and the two specimens are placed side by side in a warm place. About twenty-four hours are required for complete fermentation and quantitative estimation, *but the diagnosis can often be made in a very short time, as the appearance of any considerable amount of gas proves the presence of glucose.* By using Einhorn's saccharometer the amount of sugar may be determined by the scale measuring the volume of gas produced.

Rapid work possible.

Rougher Method.—Lacking any form of fermentation tube, the test may be made by taking two specimens prepared as previously

directed and carefully noting the specific gravity of each. To one specimen yeast is then added, the urine set aside in a *loosely stoppered* flask or bottle, and upon the following day a second reading of the specific gravities is taken. If glucose be present, the yeast-treated urine will have lost weight; and each degree of density lost, as indicated by the comparative specific gravities, roughly corresponds to one grain of glucose to the ounce of urine (0.22 gm. to 100 c.c.). *The specific gravity should not be taken the second time until the urine has cooled to the temperature it had when the first estimate was made.*

A necessary precaution.

Quantitative Estimation with Whitney's Reagent.—In addition to the previously described tests may be mentioned that of Whitney, which is more rapid than the fermentation test, and reasonably accurate. The solution and apparatus are sold by the Lewis Chemical Co., of New York. The formula is undoubtedly very nearly like Purdy's solution, of which a full description may be found in Dr. Purdy's excellent work. In short, it is an ammonio-cupric-sulphate solution.

Test.—One dram is heated to boiling-point and the urine is added drop by drop, the mixture being boiled for from three to five seconds after each addition. If no change occur, the process is continued until ten or fifteen drops have been added. If sugar be present, the blue color begins to fade, and is finally entirely removed, leaving a colorless solution. The amount of sugar present is then estimated by the following table:

If Reduced by Minims,	It Contains to the Ounce:	Percentage.
1, ...	16 or more grains.	3.33
2, ...	8 grains.	1.67
3, ...	5.33 "	1.11
4, ...	4 "	0.83
5, ...	3.20 "	0.67
6, ...	2.67 "	0.56
7, ...	2.29 "	0.48
8, ...	2 "	0.42
9, ...	1.78 "	0.37
10, ...	1.60 "	0.33

If the amount of sugar be large, as indicated by the loss of color following the addition of one drop, the urine should be diluted by doubling or trebling its volume by the addition of

distilled water, and the result then obtained must be multiplied by two or three, as the case may be.

The duration of the boiling period must be neither more than five nor less than three seconds.

Urea (normal quantity per liter, 20 to 40 gm.).—The estimation of urea is one of the simplest and most important of all clinical tests, and though the life-insurance examiner seldom has occasion to use it, the clinician must often depend upon its variations, both in diagnosis and prognosis. The simplest method of quantitative testing is that of Doremus.

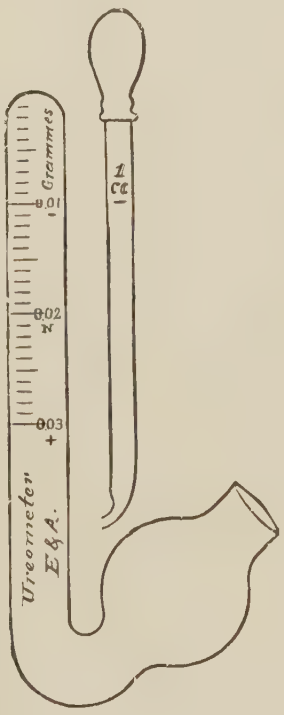


FIG. 80.—THE DOREMUS UREOMETER.

Description of the Doremus Ureometer (see Fig. 80).—"Doremus' apparatus is much used, and consists of a bulb and graduated tube and a small, curved, nipple-capped pipet to hold 1 c.c. of urine. The tube is graduated so that each of the small divisions equals 0.001 gm. of urea. It is filled with hypobromite solution of the usual strength to the mark on the long arm of the apparatus, and water added to fill the remainder of the arm and the lower part of the bulb. The pipet is then filled with urine up to the c.c. mark, and the point carefully introduced into the bend as far as it will go, holding the measuring tube perpendicularly. The nipple is then slowly and thoroughly compressed so as to expel all the urine. After the evolution of gas is complete the number of divisions is read off and the result multiplied by 100 to obtain the percentage" (Tyson's "Urinalysis").

The ureometer is graduated for 65° F.

The Cayenne-pepper deposit.

Uric Acid (0.4 to 0.7 gm. daily).—As a sediment, uric acid is easily recognized by microscopic examination or by the macroscopic deposit of a substance resembling Cayenne pepper.

The conditions favoring a uric acid deposit are: (*a*) Concentrated urine; (*b*) high acidity; (*c*) deficiency of salts and pigment; (*d*) excess of uric acid.

The appearance of such a sediment in a single specimen is suggestive of lithemia, and should call for further investigation.

Chlorids (Normal, 12 grams per diem).

Rough Test.—Filter the urine if it be not perfectly clear; remove albumin by boiling, if necessary. Prepare a solution of silver nitrate and distilled water (silver, 1 part; aquæ destillat., 8 parts).

Add this, drop by drop, to a portion of the suspected urine which has been treated with a few drops of nitric acid. A curdy precipitate indicates normal chlorids. Milky turbidity or simple cloudiness points to a reduction of the chlorids to 1 per cent. No precipitate indicates absence of chlorids. The value of this procedure in clinical work arises from the fact that the outpouring of a serous or fibrinous exudate in acute disease is associated with a diminution or total absence of the urinary chlorids, one of the first evidences of resolution in lobar pneumonia being the reappearance of the lost chlorids. Their estimation is also of great value in making a differential diagnosis between meningitis and typhoid fever, they being markedly reduced in the former and but little affected in the latter disease. So, also, in acute rheumatism a sudden disappearance of the chlorids points to pericarditis, or, according to Wood,* to either pericarditis or endocarditis.

Clinical significance.

Pus.—Pus in the urine is readily recognized by chemic or microscopic tests. Phosphates and the pale urates may mislead the careless observer, but should never cause confusion.

Urates are dissolved by heating.

Phosphates disappear if an acid be added, whereas *both the foregoing procedures will increase a turbidity due to pus.*

Chemic Test.—Add liquor potassæ to the suspected urine, and shake the solution vigorously. The persistence of suspended air-bubbles and viscidity indicate the presence of pus. If the amount be very large, or if the liquor potassæ be added to the sediment after decanting the supernatant fluid, a gelatin-

* "Lectures on Clinical Chemistry."

ous mass results. The microscopic test is more definite when mere traces of pus are present, and is described on a subsequent page.

Blood.—The color of urine containing blood in quantity has already been described. In general, it may be said that acid urines containing blood are dark or smoky, and alkaline urines bright red. Oftentimes its presence must be detected even though the amount is insufficient to color the urine, and, moreover, mere color can not be depended upon in any case.

Microscopic, spectroscopic, and chemic tests.

The microscopic examination is extremely important, but one must remember that the coloring-matter alone may be present, or that the cells, even if originally there, may entirely disappear in old or alkaline specimens.

The spectroscope when available affords a ready means of determination, but usually one must depend upon chemic tests.

Heller's Test for Blood:

(*a*) Boil the urine in a test-tube.

(*b*) Add caustic soda, and continue the boiling as long as precipitation continues. If blood be present, the phosphatic precipitate is brownish red and the supernatant fluid a bottle-green. The test is said to detect 1 part of blood to 1000 parts of urine.

Accuracy.

The Guaiacum Test for Blood.—Shake in a test-tube equal parts of old turpentine or hydrogen peroxid solution and fresh tincture of guaiacum. Pour this mixture gently down along the side of the tube so as to overlay the urine. If blood or pus be present, a blue band appears at the point of junction. If this be due solely to blood, it persists when the temperature of the mixture is raised to the boiling-point, whereas if pus alone be present, the color disappears. As oftentimes both are present in the urine, the reaction may lack precision.

Is also a test for pus.

Bile.—Bile acids or bile pigment are both found in the urine under certain conditions. Bile pigment, if present in considerable quantity, is readily detected by the yellow-tinted foam produced by shaking.

The yellow foam.

The best chemic test is made as follows:

Filter the suspected urine several times through the same filter-paper. Drop fuming nitric acid upon the wet paper and watch for the characteristic color play—viz., orange, red, violet, and green, the last being the essential color.

Play of colors.

Maréchalt's Test.—Overlay a portion of the suspected urine in a test-tube with an alcoholic solution of iodin (tincture iodin, 10 parts; alcohol, 90 parts). If bile be present, a beautiful green band appears at the junction point.

The Examination of Urinary Sediments.—The accurate microscopic examination and correct interpretation of urinary sediments demand a thorough knowledge of the special technic involved. Gross error is possible in two directions:

1. Through failure to detect important abnormal elements.
2. Through misinterpretation of the elements found.

The importance of microscopic work.

Every man who undertakes insurance work should not only own a microscope, but be able to use it, and no time can be more profitably employed than that which is spent in acquiring a correct technic. He who graduates from the schools of to-day is, or should be, trained to a degree that will enable him to do reasonably accurate work in this line. On the other hand, many excellent men of the older generation, through lack of early training and opportunity, are sadly deficient in this important branch of clinical medicine. Very few men, whether old or recent graduates, are fitted to do *critical* work in microscopy, and it would be well if every insurance company employed one or two men in each State to act for them in important cases requiring the services of a trained clinical microscopist.

The centrifuge.

To Obtain a Sediment.—In order to procure a sediment for microscopic examination it was formerly necessary to allow the urine to stand for twenty-four hours in a conic glass. Now almost every examiner has at his disposal some form of centrifuge, and may examine the suspended elements in the urine without delay. The advantage of the modern method is great, inasmuch as it eliminates that fertile source of error, decomposition of the urine.

Essential points.

Examination of the Sediment.—In examining a urinary sediment microscopically, the first essentials are *correct focusing and a comparatively dim light.*

Every microscope should be provided with an iris diaphragm and a nose-piece holding three objectives, one low power, one medium, and for the third a high-power oil-immersion lens.

In urinary work only the first two are required, save in those cases in which the tubercle bacillus is the object sought. The examiner should commence operations with a dim light and his

Lenses and illumination.

low-power lens (1-inch or ½-inch objective), this being by far the best for *finding* casts, as it distinctly shows their outline and gives a larger field. He should then slightly increase his light and bring his medium-power objective (¼ to ⅙ inch) into focus. This brings out the *structure* of casts, and renders distinct any cellular elements or crystals that may be present in the field. Having once found any object of interest, the lenses and the illumination may be varied at will.

FIG. 81.—(*After Jakob.*)
a. Calcium phosphate. *b*. Calcium sulphate.

Substances Found in Urinary Sediments.—The following are the substances most frequently found in urinary sediments:

Extraneous material, such as fibers of cotton, linen, wool, or silk, various vegetable forms from the rinsing water, if it be not distilled, starch-grains, etc. (Such substances are quite unlike urinary products, and need ordinarily produce no confusion.)

Phosphates. The macroscopic appearance of the phosphatic deposit is well known. The grayish-white material so often mistaken for pus is composed of amorphous calcium and magnesium phosphates, and their ready solubility in mineral acids

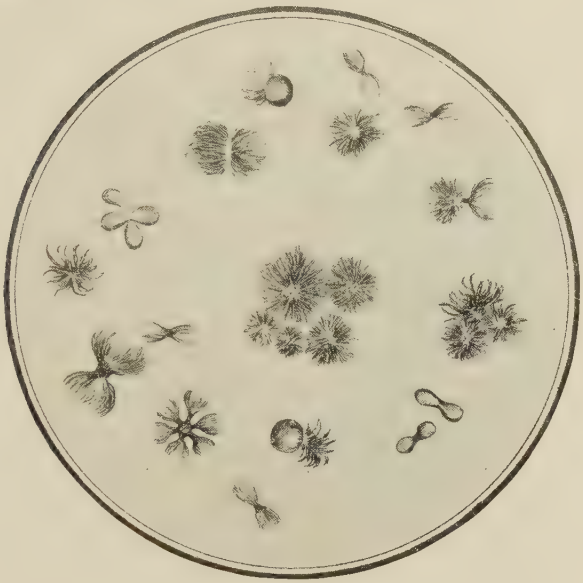


FIG. 82.—AMMONIUM URATE.

FIG. 83.—AMMONIO-MAGNESIUM (TRIPLE) PHOSPHATE.

at once identifies them. They are found only in alkaline urine, and if ammoniacal fermentation has occurred, will be associated with beautiful crystals of the triple phosphate (see Fig. 83).

Calcium phosphate may also appear in crystalline form (see Fig. 81).

Urates.—The ordinary deposit of urates occurs in moderately acid, concentrated urine during the process of cooling or when exposed to an unusual degree of cold. The color varies from yellow to rose red, the latter constituting the so-

FIG. 84.—URIC ACID CRYSTALS.

Brick-dust deposit.

called brick-dust deposit (sedimentum lateritium). Upon the application of heat they promptly disappear. When nitric acid is added to a urine rich in urates, a deposit of nitrate of urea is formed. The urates are amorphous, excepting only the ammonium urate, which occurs in ammoniacal urine as the so-called thorn-apple crystals. (See Fig. 82.)

Uric Acid.—Uric acid may be precipitated from any urine, if concentrated, during the so-called acid fermentation, or in hot weather, when the high temperature prevents precipitation

of the urates. Excessive acidity and concentration or a pathologic excess may occur in certain conditions. *Urine when passed should never contain the crystals as a precipitate.*

Abnormal in freshly passed urine.

The macroscopic deposit resembles Cayenne pepper. The microscopic appearance is best shown by the plate (see Fig. 84).

Calcium Oxalate.—This rarely forms a visible sediment, and is abnormal if found in urine freshly passed. The crystals are characteristic and unmistakable (Fig. 85).

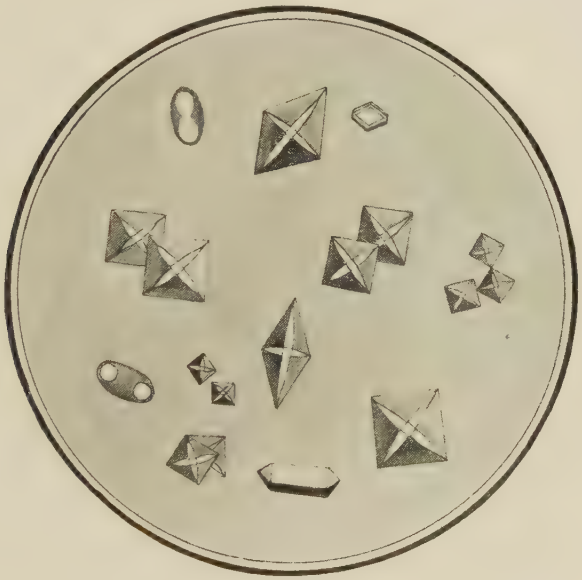


FIG. 85.—CALCIUM OXALATE.

Leucin, *tyrosin*, and *cystin* are rarely seen, but may be readily recognized by comparison with the plates (Figs. 86 and 88).

Calcium Carbonate.—This is occasionally precipitated with the earthy phosphates. Usually it is amorphous, but occasionally forms crystals shaped like a dumb-bell. It is easily recognized by the effervescence produced when a mineral acid is added.

The Organized Sediment.—The organized constituents of the urinary sediments are far more important than the inorganic. The chief elements or substances are :

(*a*) *Blood.*

(*b*) *Pus.*
(*c*) *Spermatozoa.*
(*d*) *Bacteria.*
(*e*) *Epithelium.*
(*f*) *Casts* (*pseudocasts*, *true casts*).

Rarely one may find parasites or their ova and fragments of new growths.

Blood.—The blood as it appears in the urine may be quite normal in appearance, or, on the other hand, be so changed as to

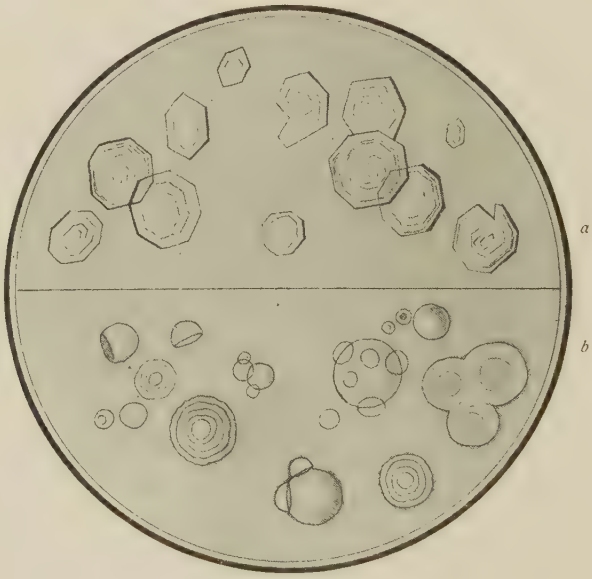


FIG. 86.
a. Cystin. *b*. Leucin.

make its recognition difficult. If hemorrhage has taken place in the urethra, prostate, bladder, ureters, or in the pelvis of the kidney, and the urine is acid and fresh, the red corpuscles appear as yellow biconcave discs, with rounded edges and a light central portion. If, on the other hand, the hemorrhage has taken place into the cortical portion of the kidney, or if the urine has stood for some hours, the corpuscles may become pale and swollen, their diameter lessened, and they may appear as mere shadowy circles, and as such are easily overlooked. Crenation

Circles.
Crenation.

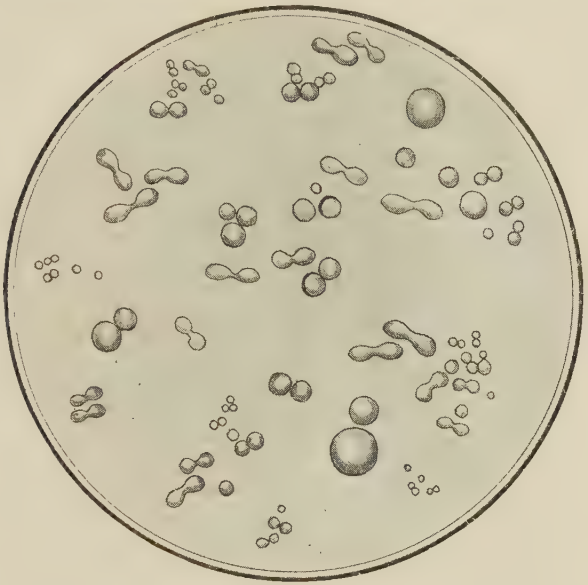


FIG. 87.—CALCIUM CARBONATE.—(*After Jakob.*)

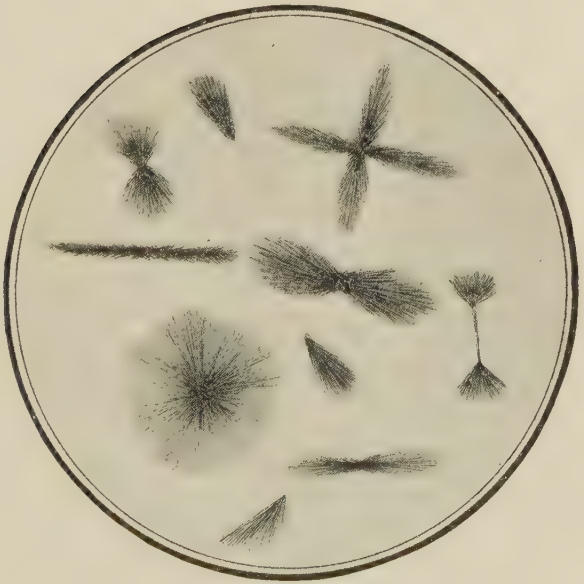


FIG. 88.—TYROSIN.

of the normal cells may also occur in a urine that is deficient in salt. Such cells have irregular, star-like processes along their border, but retain the yellow tinge of the normal cell.

Pus.—Pus in quantity is in most cases easily detected by the chemic test. The pus-cell as seen under the microscope is precisely like the white cell seen in a smear preparation of normal blood, but is less easily recognized as such in the urine. In the acid urine the pus-cells are usually larger than the red cells,

Characteristics of pus-cells.

FIG. 89.

a, *b*. Various forms of fungi and bacteria. *c*. Pus-cells before and after treatment with acetic acid. *d*. Various forms of red blood-cells.

are colorless, granular, and, as a rule, have several nuclei readily distinguished by careful focusing. The presence of these nuclei serves to distinguish them positively from the red cells (see Fig. 89).

Treating with acetic acid.

Any doubt upon this point may be readily removed by allowing a drop of a very *dilute solution* of acetic acid to run beneath the cover-glass, assisting the process, if necessary, by laying the edge of a piece of filter- or blotting-paper against the opposite

edge. The acetic acid dissolves the granules and brings out clearly the cell nuclei, but unless very dilute, will destroy any hyaline casts that may be present. In alkaline urine the pus corpuscles are soon destroyed, becoming agglutinated and losing their structural characteristics.

Effect of alkaline solutions.

Varying Significance of Pus in the Urine.—As to the significance of pus in the urine, it may be remembered—

(*a*) *That pus that comes with the first jet of urine, the remainder being clear, is from the urethra.*

Fig. 90.—Bladder Epithelium (Various Forms).

(*b*) *That a moderate amount of pus occurring in an acid urine is usually from the renal pelvis; but that such pus may be due to tuberculosis of the bladder.*

(*c*) *Large quantities of greenish pus point to rupture of an abscess into the urinary passages or to a pyelonephrosis.*

(*d*) *Pus in an alkaline urine is usually from the bladder.*

In all cases the diagnosis must largely depend upon the character of the associated epithelium and the presence of casts or specific micro-organisms.

Spermatozoa are easily recognized by their anatomic appearance (see Fig. 92).

Bacteriurea.

Bacteria.—Aside from the tubercle bacillus, many forms of bacteria may be found in the urine, and their presence may be unattended by symptoms or accompanied by a variable amount of irritation of the bladder. So, also, in fermenting urine one finds both bacteria and spores. The spores are highly refractile and tend to form chains (see Fig. 89).

The most important bacterium is the tubercle bacillus, only to

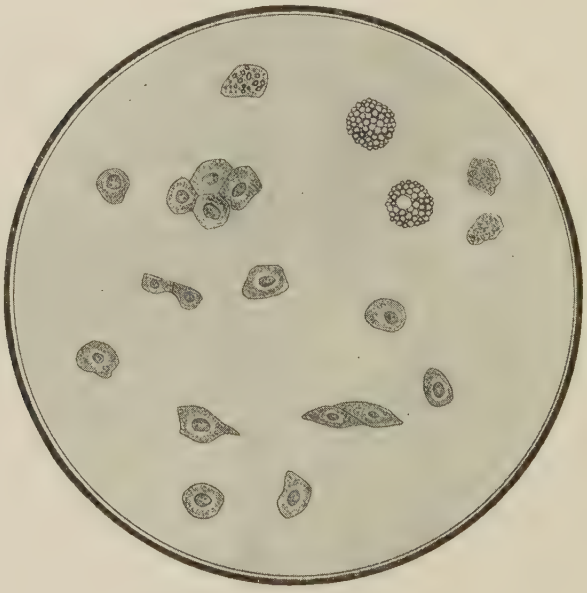


FIG. 91.—VARIOUS FORMS OF RENAL CELLS, INCLUDING "COMPOUND GRANULE CELLS."

be recognized by such staining methods as are described on page 310.

The ordinary bacterial urine is persistently cloudy, has a musty odor, and presents on shaking a swirling appearance, as if fine grains of sand were put in motion.

Differentiation difficult.

Epithelium.—In spite of the efforts put forth by microscopists, the exact differences existing between the epithelial cells of different portions of the urinary tract have been only partly determined. Such variations are shown by the plates, but must

be learned from the careful study of specimens obtained from known cases of cystitis, nephritis, etc., a mere description being of slight value (see Figs. 90, 91, 93).

The renal cells.

The renal cell as seen in the urine is usually small, round, and mononuclear. Cells from the straight tubules are somewhat larger and have a more irregular shape, being sometimes square or polygonal, *but all renal cells are mononuclear.*

Caudate cells.

Caudate cells arranged in overlapping layers are often described as the characteristic cells of the renal pelvis, but as a matter of fact they represent only the superficial layer, and are seen only in early or mild cases of pyelitis. The cell from the deeper layer strongly resembles the renal cell.

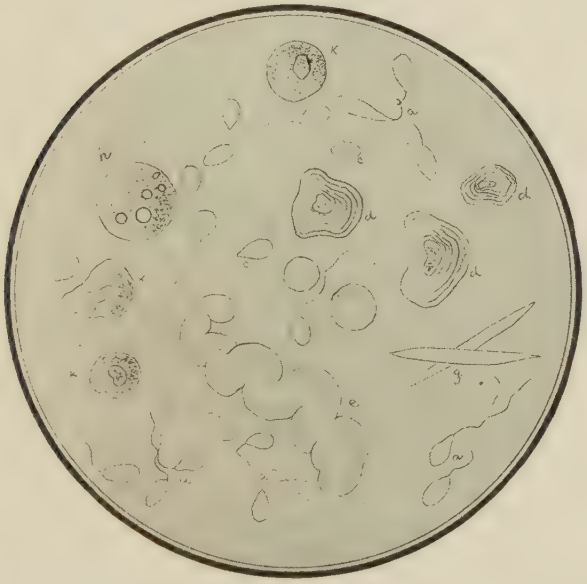


FIG. 92.—SPERMATOZOA AND ASSOCIATED SUBSTANCES IN URINARY DEPOSIT.
a, *a*, *a*, *a*. Spermatozoa. *c*, *c*. Spermatozoa, tail out of focus. *d*, *d*, *d*. Amyloid corpuscles. *e*. Prostatic cast. *g*. Crystals. *h*. Lecithin-granule cell. *k*, *k*, *k*. Epithelium.

Ureteral cells are spindle-shaped.

Bladder epithelium.

Bladder epithelium is generally of the well-known tessellated or pavement variety, and may be distinguished from vaginal epithelium only by the fact that the cells are somewhat smaller, never overlap, and occur in a single layer.

Vaginal epithelium.

Vaginal epithelium is rather larger, the cells overlap like the shingles on a roof, and are likely to occur in masses consisting of several layers.

The epithelium from the neck of the bladder, prostate, and the calices of the kidney pelvis are practically indistinguishable.

Casts.—Casts are of two kinds:

1. The *true cast*, which has its origin in an exudate from the tubules of the kidney.

FIG. 93.

a. Epithelium from the renal pelvis. *b*. Vaginal epithelium.

2. The *pseudocasts*, or cast-like bodies, which may or may not originate in the kidney.

Nature and source.

True Casts.—The exact nature and source of the true casts are not positively known. Whether they consist of disintegrated and modified epithelium, of a morbid secretion of the epithelium, or are simply coagulated materials from the blood, the fact remains that they appear clinically as casts of the renal tubules, having to a great extent a form and caliber corresponding to that portion from which they come, and appearing hyaline, waxy, fibrinous, granular, fatty, epithelial, or bloody, according to

FIG. 94.

FIG. 95.

Figures 94 and 95 show the effect of low and high illumination.
In figure 94 hyaline casts are plainly visible, one carrying four renal cells.
In figure 95 *the casts are entirely lost* in the flood of light, and only the renal cells appear.

the nature and extent of the pathologic changes from which they result.

Hyaline degeneration.

If we assume that their basis is that pathologic change known as hyaline degeneration, it becomes very easy to understand most of their modifications. Such a process would lead ordinarily to the formation of a *hyaline cast.*

Granular casts.

If the granules of the degenerated cell adhered to or became intermixed with the deposit, a *granular cast* would result, and this would be finely or coarsely granular, light or dark, according to

FIG. 96.
a. Waxy casts. *b*. Fatty or fat-bearing casts.

the activity of the pathologic process. Fatty degeneration in the cells would be reflected in the *fatty cast.* Adherent desquamated cells would form the *epithelial cast,* adherent blood-cells the *blood cast,* etc.

Fatty casts.
Epithelial casts.
Blood casts.

It is reasonable to suppose that the basis is the same for all varieties, and that in the hyaline, waxy, and fibrinous casts we have but slight variations in structure, though the conditions attending their presence may be quite different and distinct, and their significance definite and important. The *hyaline cast* is

Hyaline cast.

transparent, and shows an apparently homogeneous structure; its size is variable, its ends are rounded, and its sides are nearly parallel. Its shape is best shown in the plate (see Fig. 95).

Unless careful focusing and proper shading of the light be employed it will certainly escape detection (see Fig. 94).

Representing, as these hyaline casts do, the least degree of pathologic or at least of inflammatory change, it becomes at times a difficult question to determine their significance and cor-

FIG. 97.—GRANULAR CASTS. Light and dark, coarse and finely granular.

rectly estimate their importance. Some observers report them as present in nearly every urine if the centrifuge be employed.

Significance of the hyaline cast.

Occurring alone, and unassociated with albuminuria or with other symptoms pointing to diseased kidneys, it must be admitted that their significance is less grave than would have been assigned them by the older teaching. *It may even be considered an open question as to whether, under such conditions, hyaline casts obtained by the centrifuge, unless present in considerable numbers, are to be considered as abnormal.* It is a much debated question as to whether they are ever found without some degree of albuminuria.

According to Wood, the hyaline cast is always associated with the pale and very finely granular cast. They rapidly disintegrate in alkaline urine or in that treated with acetic acid.

The usual significance of the hyaline and finely granular cast, existing alone, is found in their predominance in chronic passive congestion and interstitial nephritis.

Highly refractile.

The Waxy Cast.—This cast is very highly refractile and usually of large size. It stands out as clearly upon the field as does the triple phosphate crystal, and once seen, is never forgotten.

FIG. 98.—*a*. Blood cast and hyaline cast carrying blood-cells. *b*. Leukocyte or pus-cast. *c*. Hyaline cast carrying renal cells. *d*. Epithelial casts.

It points to one of three conditions: amyloid kidney, advanced chronic parenchymatous nephritis, and the terminal stage of interstitial nephritis. Ultzmann states that it may be present in tuberculosis of the kidney.

In amyloid kidney it appears earlier than in interstitial nephritis. Indeed, in the latter it marks the beginning of the end, and cases of contracted kidney in which it is found will usually terminate fatally within one year.

The Fibrinous Cast.—This resembles the waxy cast save in

color. It is always brown, deriving its color from blood pigment, and, as might be expected, points to an active or subsiding inflammation; ordinarily, to acute Bright's disease. Brown color characteristic.

The Blood Cast.—This points to acute inflammation, as does also the—

Brown Granular Cast.—The coarse granular cast is usually associated with fibrinous or with waxy casts.

The fatty cast is most frequently seen in convalescent cases of acute nephritis or in chronic parenchymatous nephritis.

Epithelial casts occur only in acute or subacute inflammation, in acute Bright's disease or the subacute exacerbation of a chronic parenchymatous nephritis.

Many casts contain here and there an epithelial cell, yet can not properly be called epithelial casts.

The following summary may prove useful:

SIGNIFICANCE AND ASSOCIATION OF CASTS.

Hyaline and Finely Granular Casts.
- Interstitial nephritis.
- Amyloid kidney.
- Chronic congestion of kidney.

Waxy Casts.
- Terminal stage of chronic interstitial nephritis.
- Advanced parenchymatous nephritis.
- Amyloid kidney.

Fibrinous casts, *Blood casts*, *Epithelial casts*, *Hyaline casts*, *Granular (dark)* — Acute and subacute nephritis.

Fatty, Dark granular, Epithelial, Hyaline, — Convalescence from acute nephritis.

Fatty, Hyaline, Finely granular, — *Uncomplicated* chronic parenchymatous nephritis.

SOURCES OF ERROR IN SEARCHING FOR CASTS.

Cast-like Forms.—The amorphous urates are frequently grouped in cast-like forms, and similar accumulations of bacteria and other sedimentary substances may perplex the tyro. They Urates and bacterial casts.

will seldom or never deceive the trained eye, as they lack the definite boundary-line of the genuine cast. Urates, moreover, are promptly dissolved by heating the preparation. More deceptive still are the *cylindroids;* indeed, they are so closely related to true casts as to possess much the same importance. They are usually longer and more band-like than the hyaline cast, and more apt to be convoluted or twisted.

Cylindroids.

Mucous cylindroids.

Mucous cylindroids are common, and occur in many normal urines. They can not be mistaken for true casts if the observer has ever seen the latter, being distinctly of a different composition.

If doubt exist, a drop or two of very dilute acetic acid may be added. This dissolves the hyaline cast and does not affect the mucous cylindroid.

THE EXAMINATION OF THE URINE FOR TUBERCLE BACILLI.

Tubercle bacilli may be found in urines that are in every other respect almost normal.

If such a condition be suspected and a special examination requested, the urine must be passed in the examiner's presence and set aside until a sediment has formed, or, better still, subjected to prolonged treatment in the centrifugal machine. The sediment is then examined precisely as in the case of the sputum, save that a small quantity of egg-albumen is added to the specimen before placing it on the cover-slip, and that after staining in carbolfuchsin and washing in water the smear is invariably washed for thirty seconds or more in alcohol (95 per cent.) to decolorize any smegma bacilli which might otherwise retain the stain and mislead the observer.

To exclude smegma bacilli.

Ehrlich's Typhoid Diazo Reaction.—Although not a part of the formal examination for life insurance, this test may yield important information in those obscure cases of fever which now and then puzzle and perplex the examiner.

The test was introduced by Ehrlich in 1882, and, after meeting much opposition and criticism born of misunderstanding and misapplication, has at last been accepted at its true value in most of the important clinics.

Author's modification of test.

Solutions Required.—Solution A.—Hydrochloric acid, 50; distilled water, 1000; sulphanilic acid, q. s. ad sat. (should be thoroughly saturated).

Solution B.—Sodium nitrite (not nitrate), $\frac{5}{10}$ per cent. ($\frac{1}{2}$ of 1 per cent.) solution in distilled water.

Solution C (Test Solution).—*One hundred* parts of *A* plus *one* part of *B*.

The original test solution of Ehrlich was made by adding to 40 parts of solution *A* 1 part of solution *B*. This the author has modified by using 100 parts of *A* to 1 of *B*, with the effect of eliminating many disturbing factors and doubtful reactions. Dr. C. E. Simon suggested the ring method of testing described below.

To apply the test, take equal parts of *C* and the urine. Shake thoroughly, and add aqua ammonia in excess, allowing it to run gently down the tube so as to overlay the mixture below. If the reaction be present, a deep-red band appears at the line where the ammonia meets the mixture, and when shaken, it yields a pink or rose-colored foam. To the so-called secondary reaction —*i. e.*, a green precipitate after several hours—no further reference will be made.

The following rules must be carefully observed:

1. Use fresh urine.

2. See that the reaction is acid and the urine filtered.

3. Use a fresh test-solution.

4. Keep the sodium nitrite solution in a black bottle and in a cool place, and renew it frequently. The sulphanilic solution keeps indefinitely.

5. Hold the tube near, but not against, a white background, the source of light being behind the observer. Artificial light should not be used.

Common errors.

6. Accept no color but a distinct red, and regard no reaction as a true one in which the solution when shaken does not yield a pink foam. Pseudoreactions occur in which the band is of the proper color, but the foam is yellow or brown. The most absurd errors have arisen from a failure to observe the exact technic here outlined, and some excellent men have used sodium nitrate, weak ammonia, or even omitted the addition of ammonia altogether, and naturally failed to get any reaction at all. Others have admitted yellow and orange reactions, or have even used a *5 per cent. solution* of sodium nitrite, and consequently obtained the reaction in every urine.

Pseudo-reactions.

Value in diagnosis.

The test is not pathognomonic, as was originally maintained by Ehrlich, but is constant in all severe forms of typhoid, appearing sometimes as early as the fourth or fifth day, though more generally at the end of the first week or ten days, and persisting until the fever begins to decline. If the test be applied according to the author's method, it is absent in malaria, appendicitis, pneumonia, and the earlier stages, at least, of acute miliary tuberculosis, occurring only, in the author's experience, in some of the exanthemata, in certain cases of advanced malignant disease, and in febrile cases associated with septic absorption. Pseudoreactions are found in a considerable number of diseases.

It is consequently of great value, not alone as a positive sign, but still more as a negative one, for it is the author's firm belief that it will be found to be present at some stage in all severe cases of typhoid, and that its persistent absence in any such case quite certainly negatives the diagnosis of typhoid.

THE INSURANCE OF SUBSTANDARD LIVES.

Desirability.

All insurance companies would welcome any safe and equitable plan under which insurance might be granted along broader lines; indeed, life insurance can hardly be considered as fulfilling its whole function when it offers protection only to the families of healthy men and fails to provide for those who, being dependent upon impaired lives, have much greater need of its benefits.

This idea has governed the action and molded the policy of several foreign companies for many years, but in the United States it has, in the past, met with little favor, though certain slight degrees of impairment have been covered by endowment policies. Quite recently one of the largest American companies has commenced to insure substandard risks of nearly all grades, and it seems probable that in the near future a similar policy may be adopted by other companies.

What is the Standard Life?—The moment that a company attempts to insure substandard lives it becomes necessary to consider just what is meant by a standard life.

A standard life may be considered as one represented by an applicant who may fairly be expected to live to very old age. Nothing is more erroneous than the assumption that any man who may seem to have a fair chance of reaching his expectancy is a standard risk. The expectation of life represents merely the mean after-lifetime of a group of men of the same age. To make good the average, there must be a certain number falling short of the mean after-life, and a certain number who exceed it. That is to say, the total ages of those who die short of their expectation must be balanced by a certain number whose total ages exceed it.

Expectation of life not the test.

Let it be assumed, for example, that a man aged twenty-five applies for insurance; by the tables he would have an expectancy

of about thirty-eight years, or would reach the age of sixty-three. But if his condition indicates that he will probably live only to that age, he is manifestly not a first-class risk, for sixty-three is not old age. The question must always be, Has the individual a fair likelihood of living to a good old age, or will a thousand such live, on *the average*, to the age of sixty-three years? If the person looks as though he would live only to age sixty-three, he belongs to a class whose average life will be only about twenty years.

The Crucial Point.—*The greatest difficulty lies, not in the mere rating of risks upon a basis of safety and profit for the insurer, but rather in making such ratings equitable and fair to all who insure.*

Medical forecasts.

Nothing is more uncertain, no branch of medicine more difficult, than prognosis, yet for the medical officer the whole question of insuring substandard lives is one of prognosis, and it follows that whatever system of insurance is adopted must provide for an increase in premium sufficiently great to protect the company from the element of loss due to inevitable and unavoidable error.

Actuarial forecasts.

The only possible way to reach a just and correct system is to make prognosis a matter of actuarial computation through the thorough and systematic collection and classification of large groups of risks of *known degree and kind of impairment.* If this should be found practicable, and if all companies could join hands in working out this problem, great results might be expected, and the benefit conferred would not be confined to life insurance, but would, in a large measure, accrue to the whole science of medicine. The most rational method would seem to demand an investigation of the medical history or after-lifetime of rejected risks, combined with a similar investigation of the status of accepted risks showing minor degrees of impairment. For fifty years our life-insurance companies have been rejecting from 10 per cent. to 15 per cent. of all applicants; therefore, for every ten men now insured there is at least one who has been declined and might be made a factor in such research.

Statistical basis required.

Practical Difficulties.—The practical difficulties in the way are great, and by many are deemed insurmountable. Such are:

(*a*) *The fact that the class of men applying for insurance as*

healthy lives and found to be unsound may be considered as representing the most favorable class of unsound lives, inasmuch as they are usually quite unaware of any serious physical defects; for as heart lesions or cases of nephritis are likely thus to be detected in their incipiency, too long an after-lifetime may be figured for such risks. On the other hand, if it becomes generally known that life-insurance companies accept impaired lives, the tendency will be to flood the offices with the applications of men who know themselves to be unsound, and are, on the average, more advanced and confirmed in their disease, and less amenable to treatment, than those upon whose after-lifetime the new mortality tables would be calculated.

(*b*) *The elaborate and complicated system of subclassification necessary to equitable rating.* It would be manifestly unfair to rate all cases of the same disease, or even the same lesion, alike, for one individual with a mitral regurgitation may live sixty years, and another die in a fortnight. And so, also, in the case of coexisting disease secondary to, or independent of, the primary lesion, subclassification of an elaborate kind would be necessary. Every degree of impairment through heredity would need to be separately considered, as well as the modifying effect of physique, age, occupation, and environment.

(*c*) *The difficulty that must inevitably be experienced in obtaining from examining physicians a true description of the case.* This source of vitiating error is absolutely unavoidable under the prevailing system. The average physician may be an excellent examiner and a man of good judgment, but to say that he can elicit or express in definite terms the finer shades of diagnostic signs that enter so greatly into prognosis involves a palpable absurdity. The expert diagnostician is frequently at his wit's end to read the future in physical signs, and it can not be expected that the general practitioner shall do more.*

(*d*) *The question as to whether such insurance can be made at-*

* Dr. Glover Lyons, of London, has pointed out the fact that the medical man can deal in generalities only, and that it must always require actuarial computation to fix the probable duration of life. The physician can recognize impairment and determine the question of increasing, diminishing, or persistent hazard; he can roughly estimate the degree of impairment, but statistical methods must inevitably be called in if equitable rating is desired.

tractive, and be carried on without producing disaffection among the sound risks already insured or likely to be solicited. This would, no doubt, depend largely upon the fairness of the company's ratings, and its reputation for fair dealing, solidity, and conservatism.

(*e*) *Suppression of vital facts by the applicant.* This vitiates in some degree all insurance statistics dealing with the effect of impairment.

One answer to all such objections is contained in the point-blank statement that at least one great company is doing such a business on an equitable basis, with profit to itself and without harming or alarming its sound risks or interfering with its volume of business, and that the said company is prepared to offer policies scientifically adapted to *all forms and degrees* of impairment save those arising from acute disease.

Unfortunately, the figures upon which this company's business is carried on, and the methods employed in the computation of its tables, have not been published. It is stated, however, that the rating of consumptives is based upon an analytic study of 10,000 cases showing hereditary taint with or without other impairment, and it is fair to presume, therefore, that its premium rates are based upon very extensive data.

Sources of Increased Hazard.—Substandard lives may derive their increased hazard from several sources.

(*a*) *Unfavorable family history.*

(*b*) *Unfavorable occupation, unhygienic environment, and bad habits.*

(*c*) *Past disease affecting the present health or likely to recur.*

(*d*) *Existing organic disease or evident lack of vitality.*

General Classification.—It will be seen at once that impaired lives may further be placed in three great classes:

1. *Those in which the risk increases with the lapse of years*—"increasing hazards."

2. *Those in which the risk diminishes with the lapse of years*—"decreasing hazards."

3. *Those in which the added risk is a constant factor*—"permanent hazards."

This factor of increasing and diminishing risk adds to the difficulties of the actuarial problem.

Illustrations.—In the young man whose parents have died of phthisis the risk assumed diminishes with the aging of the policy. Diminishing hazard.

In the case of the young man whose family members die of apoplexy there is, on the other hand, an increasing risk as the policy grows older. Increasing hazard.

In occupation may be found an example of permanent hazard. Permanent hazard.

Methods of Covering Extra Hazard.—How to equitably rate such risks is indeed a difficult problem. Several plans are in operation at the present time:

(*a*) *To arbitrarily charge an increased premium.*

(*b*) *To advance the age a number of years*, which is practically the same thing.

(*c*) *To make the face of the policy liable to deduction in event of death occurring within a stated period*, the amount deductible diminishing as the age of the policy increases.

(*d*) *To use the endowment policy to cover the additional risk assumed.*

All these plans are employed at the present time. The British companies use all of them, but principally *a* and *b*; the American companies generally use the endowment policy to cover slight additional risk, and the method *c* for greater risks.

A Neglected Opportunity.—Curiously enough, there is no uniformity in rating in the British companies, and, strange to say, comparatively little has been done to determine the mean after-lifetime of the different classes of substandard lives, though it is evident that locked up in the records of British companies there is a rich mine of information bearing upon prognosis in diseased states, which, if properly worked, would yield returns no less valuable to the whole medical profession than to the insurance companies and their policy-holders. Valuable data neglected.

This seemingly inexplicable apathy is no doubt due to the fact that the present methods have yielded sufficient returns to the companies, a fact reflecting the greatest credit upon the diagnostic and prognostic acumen of our British confrères, but leaving in one's mind a reasonable doubt as to the equity of the business as at present conducted. Profit to companies.

It is, indeed, undeniable that under the present plan a great injustice is often done to individuals, and, further, that under- Injustice to individuals.

rating of certain classes is balanced only by a proportionate over-rating of others.

An extended discussion of the various plans before mentioned would exceed the limits of a work of this kind, but it may be said that any of them would be proper if they could be intelligently applied.

Endowment Policies.—As to endowment policies, it must be borne in mind that long-term endowments do not adequately cover any very great increase of risk, inasmuch as the chief value of the endowment is the limitation of the time during which the increased hazard is assumed.

The following table, prepared by Mr. R. M. Moore for Dr. Hingston Fox, shows very clearly the advantage gained by the substitution of the twenty-payment life or thirty-year endowment for the straight-life policy : *

TABLE. APPROXIMATE LOSS PER CENT. TO COMPANY ON DEATH AT VARIOUS YEARS AFTER ENTRY.

Male Life, Age Twenty-one at Entry.	Years in Force—*i. e.*, Age of Policy.								
	1	6	9	16	21	26	31	36	40
Ordinary whole life policy,	98	89	77	63	47	28	5	+22	+47
Ordinary whole life policy, advanced seven years, .	98	86	72	56	36	13	+14	+47	+78
Ordinary whole life with a deduction equivalent to seven years' advance, .	82	75	65	53	39	22	1	+24	+47
"Limited payments" (20), advanced three years, . .	97	82	64	43	21	6	+12	+33	+52
Endowment (thirty years)—*i. e.*, terminating at age fifty, ...	97	82	63	41	15	+16	+37 (29 yrs.)		

Only the net premiums are taken account of, and no office loading or bonus is allowed for; interest is at 3½ per cent.

The + sign signifies gain.

Variable effects of age additions.

In all cases it must be remembered that the age of the applicant at entrance greatly modifies the effect of *age* additions, for,

* Transactions of the Life Assurance Medical Officers' Association. "The Medical Examiner," p. 176; August, 1895.

as Dr. Hingston Fox points out, the advance of seven years on a young life whose rating is low results in a comparatively slight addition, and little diminution of the company's loss in event of early death, while, on the other hand, the same addition applied to middle age becomes almost prohibitory, and the company's protection correspondingly great.

Affords but slight protection to company.

The Limited-payment Policy.—It will be noticed that the limited-payment policy advanced three years offers considerably less protection to the company than even the long (thirty-year) endowment, and, as its rates are based upon life rates reduced to terms of twenty payments, it is not adapted to cases of materially increased hazard.

Excessive Loss in the Earlier Years.—An investigation conducted by the Institute of Actuaries in 1869 demonstrated the great need of a plan that would take care of the increased risk of the earlier years of insurance in the case of impaired lives, it being proved that while *after* a period of five years the mortality of "rated-up" lives exceeded that of healthy lives (16 per cent. to 29 per cent.), the mortality among impaired lives *during* the first five-year period still more greatly exceeded the normal mortality, it being found that from ages twenty-five to thirty-four the increase was 62 per cent., and from ages sixty-five to seventy-four the increase was 25 per cent. This need is thought by many to be met by the "diminishing lien" plan.

Various plans.

Lien Policy.—Under the lien system the most common form of policy is that issued upon the "single-premium lien plan," in which the policy is charged with the insuring company's single premium for whole-life insurance at the age of entry. The amount of insurance paid, should death occur in the first year, is represented by the face of the policy minus the amount of the lien, and for each succeeding year the lien is reduced by the amount of premium paid until the entire amount is canceled, leaving the policy in force for its full face value at ordinary life rates. It will be easily understood that any form of policy may be thus issued, the lien decreasing most rapidly under a short endowment, for which the premiums paid are relatively large. Still another plan provides that the lien shall be reduced annually by a fixed sum, represented by the quotient obtained by dividing the original lien by the years of expectancy.

Endowments based upon sound life mortality.

By its limited term the endowment policy cuts off a portion of the period of hazard, especially in the case of a permanent or increasing hazard, but its rates are based upon sound life mortality, and without special additions it is not applicable to any considerable increase of risk during its insurance term.

Personal selection under endowments.

It is an interesting fact that, generally speaking, the death losses under endowment policies are comparatively small, no doubt largely because of the inevitable personal selection developed by the knowledge or belief in his soundness that prompts the applicant to make a larger investment with the chance of a personal return.

TABLE OF EXTRA PREMIUMS ON $1000.

EXTRA PREMIUM TO BE CHARGED WHEN MEDICAL ESTIMATE PLACES THE OUTSIDE LIMIT OF AGE TO WHICH PROPOSER MAY POSSIBLY LIVE AT:

AGE AT ENTRY.	AGE 75.	AGE 70.	AGE 65.	AGE 60.	AGE 55.	AGE 50.
20	.54	1.29	2.50	4.29	6.96	10.96
22	.58	1.38	2.71	4.75	7.83	12.42
24	.71	1.58	3.04	5.33	8.92	14.33
26	.75	1.75	3.46	6.04	10.25	16.58
28	.92	2.00	3.92	6.92	11.75	19.33
30	1.00	2.29	4.46	7.96	13.67	22.79
32	1.13	2.58	5 13	9.25	16.00	
34	1.33	3.00	5.92	10.79	18.83	
36	1.54	3.46	6.88	12.67		
38	1.75	4.04	8.04	14.96		
40	2.04	4.71	9.50	17.92		
41	2.21	5.08	10.33			
42	2.38	5.54	11.29			
43	2.58	6.08	12.42			
44	2.83	6.63	13.63			
45	3.08	7.21	15.00			
46	3.38	7.92				
47	3.67	8.71				
48	4.00	9.58				
49	4.38	10.58				
50	4.88	11.79				
51	5.38					
52	5.96					
53	6.67					
54	7.50					
55	8.38					

This is substantially the English table of Chisholm, modified to suit the needs of American readers.

The next table shows the *deductions for quinquennial ages at entry* from age twenty to age sixty, both inclusive, corresponding to additions to the premium of ¼, ½, and ¾ of 1 per cent.

and 1 per cent. The calculations have been made on the basis of the healthy males mortality at 4 per cent., the age for valuation being taken as the *assumed* (or rated up) age, and the deduction being distributed over a term of years equal to the expectation of life at the *true* age.

ANNUAL EXTRA PREMIUM PER CENT. (UNLOADED) INSURANCE, $1000.

Age at Entry.	Expectation of Life.	One-fourth of One Per Cent.		One-half of One Per Cent.		Three-fourths of One Per Cent.		One Per Cent.	
		Initial Deduction.	Rated-up Age.	Initial Deduction.	Rated-up Age.	Initial Deduction.	Rated-up Age.	Initial Deduction.	Rated-up Age.
20	42	$375	27¾	$610	32½	$755	36¼	$860	39¼
25	38	360	30½	610	34½	755	38	860	40¾
30	35	330	34¼	550	37¾	710	40½	810	43
35	31	300	38¼	510	41	660	43½	755	45¾
40	27	265	42½	460	44¾	600	46¾	715	48½
45	24	220	47	390	48¾	510	50½	610	52
50	20	185	57½	330	53	450	54¼	550	55¼
55	17	150	56	270	57	380	58	470	58¾
60	14	115	60¾	210	61½	300	62¼	380	62¾

NOTE.—The table is read as follows: A net extra premium of one-half of one per cent. at age thirty is equivalent to an addition of seven years and nine months to the age, and is equal to a deduction from the sum assured, commencing at $550 and diminishing by $15.70, or one thirty-fifth part, for each year survived until the original expectation of life at age thirty (thirty-five years) has been outlived.—*From Pollock and Chisholm* (*modified*).

As illustrating some of the difficulties attendant upon special rating, it may prove interesting to consider the subject of Impairment Due to Valvular Heart Disease.

RELATION, FREQUENCY, AND PROGNOSIS OF HEART MURMURS.

Important Statistical Data.—Sperling, quoted by Gibson, gives the following figures, taken from the statistics of the Berlin Pathological Institute:

Number of Cases:

Three hundred cases of endocarditis in the years 1868–70:

Location of lesions.

268 cases—89 per cent.; left side of the heart affected.
3 " — 1 " ; right " " "
29 " —10 " ; both sides " "

Total, 300

Affection of one valve only: 200 cases—66.7 per cent.; of which—

Valve affected.

Mitral valve only, ... 157 cases—78.5 per cent.
Aortic valves only, ... 40 " —20.0 "
Tricuspid valve only, ... 3 " — 1.5 "
Pulmonary valves only, ... 0 " — 0 "

Combined valvular lesions: 100 cases—33.3 per cent.; of which—

Combined lesions.

Mitral and aortic, ... 71 cases—71 per cent.
" tricuspid, ... 9 " 9 "
" pulmonary, ... 2 " 2 "
Aortic and " . . . . . 1 case 1 "
" tricuspid, ... 0 " 0 "
Mitral, aortic, and tricuspid, ... 16 cases 16 "
" " " pulmonary, ... 0 " 0 "
Tricuspid, pulmonary, and mitral, ... 0 " 0 "
" " aortic, ... 0 " 0 "
All four valves, ... 1 case 1 "

Embolism: 84 cases—28 per cent.; of these, 76 occurred in connection with the left side, and 8 with the right side of the heart.

Kidney, ... 57 cases.
Spleen, ... 39 "
Brain, ... 15 "
Digestive organs, ... 5 "
Skin, ... 4 "

PROGNOSIS IN VALVULAR DISEASE OF THE HEART.

This is a matter of great importance, and is unfortunately very hard to determine. A large number of elements enter into such a prognosis, and each would of necessity influence the rating. Such are:

(*a*) *The age.*
(*b*) *The habits.*
(*c*) *The physique.*
(*d*) *The occupation.*
(*e*) *The family history.*
(*f*) *Past illnesses and known tendencies to special diseases.*
(*g*) *Complicating diseases.*
(*h*) *The age of the lesion.*
(*i*) *The valve or valves affected.*
(*j*) *The heart outline and heart sounds.*
(*k*) *The associated symptoms.*

Age.—Persons past middle age bear cardiac lesions badly, and this is especially true of aortic regurgitation.

Habits.—Bad habits must, of course, shorten the life of any person who has heart disease. The heavy drinker, gross feeder, or the sensualist is not likely to oppose the progress of established cardiac disease.

Physique.—A good physique, plenty of blood, good muscles and lung power, a healthy skin, strong digestion, and competent kidneys are excellent prognostic omens.

The Occupation and Environment.—Any occupation involving poor sanitary surroundings, exposure to wet and cold, high altitudes, excessive muscular exertion, or nervous and mental strain must unfavorably affect the case.

Family History.—It can not well be doubted that any hereditary tendency to gout, rheumatism, heart disease, apoplexy, or Bright's disease materially and unfavorably affects the chances of a cardiac case.

Past Illnesses.—Gout, rheumatism, or a history of past syphilis especially affects the prognosis, from the fact that these diseases may recur at any time, and are potent and probable factors in causation.

Complicating Diseases.—Of all diseases that may complicate

and unfavorably affect a heart lesion, Bright's disease and arterio-sclerosis are of especial importance, as affecting the circulation and impairing the function of important organs of elimination or excretion.

Age of the Lesion.—This is frequently very difficult to determine. One may find evidence of heart disease in childhood in a deformed chest, or may be obliged to rely upon the history of an attack of scarlatina, chorea, rheumatism, or some other of the many diseases from which valvular trouble may arise. It is this fact that makes any attempt at classification so difficult and unsatisfactory.

The Valves Affected.—Mitral regurgitation and obstruction are regarded by many as the most serious lesions, *but it must be remembered that these may exist for years without symptoms*, and thus entirely escape notice until signs of marked incompensation appear. The fact that the color is so often high further prevents early recognition. On the other hand, in aortic regurgitation pallor, pain, and palpitation are likely to attract attention to the disease at a comparatively early date.

Broadbent's classification.

From personal observation of a number of cases accidentally discovered in children and adults the author is convinced that Broadbent's classification of lesions in the order of their gravity is more nearly correct. He places them as follows: Aortic regurgitation, mitral stenosis, aortic stenosis, mitral regurgitation.

Aortic stenosis *vs.* mitral leakage.

Some question might be raised as to the relative position of the last two. It would certainly seem reasonable to assume that aortic stenosis, if uncomplicated, would prove the most enduring lesion. In any event it can not be doubted that any and all of those mentioned may exist for a score or more of years under favorable conditions, and that one only, aortic regurgitation, is *likely* to cause sudden death.

Sir Andrew Clark's case.

Many will recall the late Sir Andrew Clark's story of the old gentleman who, when suffering from bronchitis, begged that if auscultation were undertaken he might be spared any allusion to his heart. According to his account, he had, when a young man, given up an excellent position, broken an engagement that promised much happiness for himself and a beautiful girl, and gone to the Continent to spend as pleasantly as he might the

few years of life that the examining physician of an insurance company thought might be allowed him. At the end of two-score years the murmur was still there—a loud, roaring, mitral stenosis, but it may be feared that the mistaken doctor died before his patient.

Signs favorably affecting prognosis.

The Heart-sounds and Percussion Outline.—A strongly beating heart in which signs of dilatation are lacking, reinforced by good arteries, affords grounds for favorable prognosis. The extension of the cardiac area should be only moderate, and along the lines proper to the particular lesion under observation. Excessive dilatation, a history of attacks of incompensation and weak or fetal heart-sounds, are of serious portent. In clinical work the author believes that the best evidence of good heart muscle is found in the promptness with which the heart outline contracts under absolute rest, though the amount of retraction, if great, suggests in itself a dangerous tendency to dilatation.

Associated Symptoms. — Certain general conditions are important as affecting prognosis. Such are anemia, habitual constipation, and dyspepsia. All of these unfavorably affect expectancy, and anemia and dyspepsia are extremely common accompaniments of cardiac disease. Of the special symptoms may be mentioned:

Chronic Congestion of the Viscera.—As has already been shown, the tendency of all heart lesions, and more especially those of the mitral or tricuspid valve, is to cause chronic passive congestion of the various organs.

Chronic congestion of the lungs gives rise to cough, dyspnea or orthopnea, and hemoptysis, the last being especially frequent in mitral stenosis.

Chronic congestion of the brain gives rise to vertigo, faintness, indisposition to mental effort, etc.

Chronic congestion of the kidneys is indicated by scanty urine of high specific gravity containing a trace of albumin and a few hyaline or faintly granular casts. And so the list of organs might be extended.

Cardiac Pain.—True cardiac pain is rare unless a genuine inflammatory condition, coronary or aortic disease is present. The old aphorism still holds good: "When the patient complains of his heart, look to his stomach."

Edema of Heart Disease.—This symptom of incompensation is especially common in mitral regurgitation, particularly when combined with secondary tricuspid leakage. It is rarely well marked in aortic regurgitation or mitral stenosis. The edema of heart disease has been described elsewhere. Its occurrence as affecting the prognosis is of the utmost importance, affording, as it does, absolute evidence of severe incompensation.

Almost every item of this complicated problem in prognosis must affect equitable rating, and would be a matter for statistical investigation if such were undertaken.

TUBERCULOSIS.

Tuberculosis offers another problem of extreme interest. It is, of all diseases, most difficult to detect in its incipiency, and most bewildering in its clinical course. Chronicity once established, the disease moves fitfully on, now smouldering, now flaring, again and again converting reassurance into doubt and hope into despair.

The most curable of all chronic diseases under the favoring conditions of early diagnosis and proper environment, it is one of the most hopeless when advanced.

POINTS ESPECIALLY AFFECTING PROGNOSIS.

In estimating the effect of tuberculosis upon the duration of life one must consider the following points:

1. *Age, sex, and race of applicant.*
2. *Weight.*
3. *Physique.*
4. *Family history.*
5. *Chest expansion.*
6. *Character and extent of the disease.*
7. *Duration.*
8. *How acquired.*
9. *Environment.*
10. *Habits.*
11. *Occupation.*
12. *Past illnesses.*

13. *Associated conditions and complications—i. e., anemia, albuminuria, dyspepsia, etc.*

14. *Hemoptysis.*

15. *Body temperature.*

16. *The rate of progress.*

17. *Individual predisposition.*

A formidable list, not one item of which can be safely disregarded. The arrest of phthisis may occur at any stage, and Fowler and Godlee report a case in which a well-marked cavity at the apex was almost certainly formed fifty years before.* In a majority of cases, however, arrest occurs during the early stage of infiltration. In general it may be said that, in private practice, the average duration of *chronic phthisis* is about seven years.

Arrest *possible* at any stage.

Average duration.

Age.—Age is a potent factor in determining the onset of pulmonary tuberculosis, and mortality statistics show that the disease is most prevalent from the age of puberty to thirty-five. It is a matter of common observation that cases occurring at puberty are apt to be acute and to do badly, yet the old are not exempt, and advanced age is not so important a factor in protection as was formerly supposed.

Youth the most dangerous period.

RATIO OF CONSUMPTIVE DEATHS TO EACH 10,000 LIVING.†

(Compiled by Dr. Edgar Holden.)

Age, ...	21-30	31-40	41-50	51-60	61-70	71—
New York City, ...	70	71	66	84	110	150
Twelve German companies, ...	29	39	34	33	32	—
Mutual Benefit of New Jersey, . . .	22	20	14	14	27	37
All England, ...	40	41	39	37	27	11
Mutual Life of New York, ...	24	20	17	14	18	30
United States Census, 1870, ...	23	27	27	31	40	79

Dr. Hingston Fox says:

"It is a matter of common clinical observation that the liability to phthisis falls especially on the early years of adult life. The Registrar-General's returns are sometimes quoted to show

Observations by Dr. Fox.

* "The Diseases of the Lungs," Fowler and Godlee, p. 380.

† Dr. A. B. Bisbee, "Some of the Conditions which Appear to Favor Tuberculous Infection."

that the mortality from this cause is nearly as great in later life. This is true in the strict sense—*i. e.*, taking the ratio of deaths to persons living at those ages. But if, for insurance purposes, we take 1000 persons living at age twenty-one, we find, of course, that the number surviving to subsequent ages is constantly diminishing. The mortality calculated on these diminishing numbers will show a more marked decrease in later years.

DEATH-RATE FROM PHTHISIS.

Hm. 1000 Entering at Age Twenty-one: Numbers Surviving.	Years of Age.	Registrar-General Deaths from Phthisis per Mille per Annum. Males.	Estimated Deaths from Phthisis per Mille per Annum of Males Entering at Age Twenty-one.
990	20 to 24	3.09	3.06
943	25 to 34	3.70	3.49
864	35 to 44	4.12	3.56
765	45 to 54	3.86	2.95
622	55 to 64	3.19	1.98

Dr. Reginald Thompson on family phthisis.

"These figures refer, of course, to all forms of phthisis. But Dr. Reginald Thompson has shown, in his work entitled 'Family Phthisis,' that the mortality from inherited phthisis falls more markedly upon the earlier years of life than that from the acquired disease, which is distributed throughout life. Hence the death-rate given above would show a greater decrease in the later decads if deaths with a tubercular family history were alone included. Further, the mortality from all causes greatly increases in later life, hence *the proportion of phthisical deaths to total deaths* will become less and less, ranging from 42 per cent. of all deaths at ages twenty to twenty-four, down to only 5½ per cent. of deaths at ages fifty-five to sixty-four." *

Sex.—Sex is chiefly important as related to the unfavorable effect of child-bearing upon a woman of tainted stock, or the victim of an established infection, latent or active. Arthur Ransome's tables would indicate that in women chronic phthisis runs a shorter course than in men.

Race.—Race is not an unimportant factor. The American

* Dr. R. Hingston Fox, Life Assurance Medical Officers' Association, March 27, 1895, "The Medical Examiner," August, 1895.

Indian, the negroes, particularly those of mixed blood, mulattos, and the like, are, in this country, very susceptible. Here, also, the Irish show a large death-rate from this disease, and the author has frequently been impressed by the curious lack of resistance shown in recently arrived immigrants, both of Celtic and Scandinavian stock. On the other hand, it would seem certain that the Hebrew race is to a certain extent immune.

Weight.—A reference to the tables of Dr. Marsh in the chapter on Heredity, and to those of the Washington Life and National Life, will serve to illustrate the importance of this feature.

Progressive loss of weight is most important, and a comparison of the "best weight" with that present at the time of examination often yields an astonishing result.

WEIGHT AS RELATED TO TUBERCULOSIS.

(Combined Experience of Washington Life and National Life.)

Number of Cases, 3548.	Predisposition, Hereditary or Acquired, or Both.	No Predisposition.
	Percentage of Consumptive Deaths.	Percentage of Consumptive Deaths.
Weight above the standard, ...	5.59	5.20
Weight standard, ...	25.91	15.67
Weight below the standard, ...	42.51	24.20

From Dr. A. B. Bisbee's paper.

Physique of an Applicant.—The physique of an applicant must, of course, be important in prognosis. A skin that closely fits the body and is elastic and pink, large bones, firm muscles, a good chest, and sound stomach, heart, and kidneys, give promise of a long and successful fight against an established infection if the original or existing process be not acute.

Family History.—Family history is fully discussed in the chapter dealing with heredity, and furnishes in itself no less than eight distinct points that should be considered in special rating. (See Heredity.)

Chest Expansion.—Arthur Ransome has given the profession

CHEST MEASUREMENT.

(Experience of National Life.)

Number of Cases, 1454.	No Predisposition.			Predisposition, Hereditary, or Acquired, or Both.		
	Number of Cases.	Deaths from Consumption.	Percentage.	Number of Cases.	Deaths from Consumption.	Percentage.
Girth of chest less than one-half the height, ...	264	68	25.76	104	47	45.19
Girth of chest more than one-half the height, . .	781	94	12.04	305	44	14.43

NUMBER OF CONSUMPTIVE DEATHS IN FAMILY HISTORY.

(Combined Experience of Washington Life and National Life.)

	Total.	Deaths from Consumption.	Percentage.
One member of family, ...	528	121	22.92
Two or more members of family, ...	140	37	26.43

Paper of Dr. A. B. Bisbee.

NUMBER OF DEATHS AMONG LIVES WITH FAMILY HISTORIES OF CONSUMPTION COMPARED WITH EXPECTED DEATHS.

(Experience of National Life of London.)

Ages.	Actual Deaths.	Expected Deaths.
Fifteen to thirty-five, ...	169	119.7
Thirty-five to sixty-five, ...	151	132.7
Total, ...	320	252.4

FAMILY HISTORY.

(Combined Experience of Washington Life and National Life.)

	Total.	Deaths from Consumption.	Percentage.
Hereditary consumptive taint, ...	668	158	23.65
No hereditary consumptive taint, ...	3119	497	15.93
Total, ...	3787	655	17.30

From paper of Dr. A. B. Bisbee.

much valuable material bearing upon this subject,* and while emphasizing the importance of deficient expansion, has pointed out the fact that in young subjects active tuberculosis and a reasonably good expansion may coexist, though usually the acute show less expansion than the chronic cases.

As has been previously stated, forced breathing practised as a therapeutic measure may result in an expansion most misleading to the insurance examiner. In all such cases the *locally* defective expansion, or chest excursion, is the feature of greatest importance.

DEGREE OF CONSUMPTIVE TAINT.

(Combined Experience of Washington Life and National Life.)

	Total.	Deaths from Consumption.	Percentage.
Both parents,	5	3	60.00
One parent and one or more brothers or sisters,	62	19	30.65
Mother alone,	157	46	29.30
Father alone,	79	22	27.85
One brother or sister,	292	53	18.15
Two or more brothers or sisters,	73	15	20.55

Paper of Dr. A. B. Bisbee.

Duration, Character, and Extent of Disease.—It is unnecessary to spend much time upon this point. The previous health record in connection with the general condition at the time of examination and the physical signs settles the question of chronicity, character, and extent.

A slow-burning, chronic tuberculosis is often of long duration, the average being, as before stated, seven or more years.

Cases in which the process is almost or quite confined to one lung, the other being the seat of a marked vicarious emphysema, are favorable.

Cases that have stopped short of cavity formation and are limited to the apex are favorable.

Cases with involvement of the lower lobes are almost invari-

*"Relation of the Chest Movements to Prognosis in Lung Disease," Arthur Ransome, London, 1882.

ably associated with cavity at the apex and involvement of both apices * and afford an unfavorable prognosis, though sometimes undergoing long periods of latency or complete arrest. In Ransome's interesting work † the following cases are described, not selected for their long duration, but being such as he was able to follow at that time. The chronic and acute cases offer an interesting contrast:

DURATION OF PHTHISIS.—CHRONIC CASES (MALES).

Age.	Duration in Years.		Remarks.
	Before.	After.	
65	35	‡L, 5	Formerly vomica at apex, now no physical signs.
48	5	L, 1½	Right, deposit to 4 inches; left, healthy.
40	5	...	Left, large dry vomica to 4 inches; right, second stage to 6 inches.
40	9	L, 10	Right, formerly vomica at apex, now no physical signs.
31	2	L, 1½	Left, first stage to 1½ inches; right, healthy.
17	1	L, 8	Left, first stage to 2 inches; right, healthy.
35	2	‡D, 2	Left, second stage to 5 inches; right, first stage to 1½ inches.
26	6	D, 2	Left, deposit to 6 inches; right, healthy.
57	10	L, 8	Left, second stage to 4 inches; right, healthy.
26	3	...	Right, dry vomica to 3 inches; left, deposit to 1½ inches.
42	4	...	Right, first stage to 2 inches; left, incipient deposit.
25	1	D, 3	Left, first stage to 3 inches; right, healthy.
54	2	L, 11	Left, first stage to 1½ inches; right, consolidation to 4 inches; vomica at apex.
25	7	D, 2	Right, first stage to 1½ inches; left, consolidation to 4 inches; vomica at apex.
62	34	L, 2	Left, formerly vomica, now no physical signs.
29	4	D, 2	Left, upper lobe, second stage; right, healthy.
36	3	L, 2	Left, second stage to 1½ inches; right, healthy.
27	5	L, 5	Left, consolidation of apex; right, healthy.
38	5	L, 7	Left, formerly consolidation, now no physical signs.
48	9	L, 8	Left, consolidation to 2 inches; right, incipient deposit at apex.
17	1	L, 3	Right, first stage at apex; left, healthy.
18	3	L, 2	Right, second stage to 2 inches; left, deposit under clavicle.
25	4	D, 4	Left, deposit to 5 inches, large cavity; right, upper lobe, second stage.
61	1	D, 10	Right, first stage to 2 inches; left, healthy.
27	2	L, 3	Left, first stage to 2 inches; right, healthy.

* See Line of March in Phthisis.

† "On the Relation of the Chest Movements to Prognosis in Lung Disease," Ransome.

‡ The letter D signifies that the patient died so many years after the examination; L that he still was living.

DURATION OF PHTHISIS.—ACUTE CASES (MALES).

Age.	Remarks.
49	Four months' duration; left, extensive deposit in third stage; right, incipient disease; died a few months after.
27	Three months; left, second stage to 3 inches; right, third stage to 1½ inches; died eighteen months after.
21	Four months; right, third stage to 4 inches; left, incipient deposit; result uncertain.
28	Eight months; left, third stage to 4 inches; right, vomica at apex; died in sixteen months.
21	One year; right, third stage, pneumothorax; left, healthy; died one year after.
34	Eighteen months; right, second stage to 4 inches; left, deposit to 1½ inches; died four months after.
25	One year; left, large vomica; right, second stage to 4 inches; died in one year.
28	Sixteen months; laryngitis; left, third stage to 6 inches; right, second stage to 2 inches; died in one year.
22	Eighteen months; right, third stage; left, second stage to 4 inches; died in six months.
19	Eighteen months; left, second stage to 4 inches; right, vomica at apex; died in one week, suddenly.
67	Three months; right, second stage to 3 inches; left, healthy; died in three months.
22	Four months; left, second stage to 2 inches; right, healthy; died in nine months.
52	Six months; left, second stage to 4 inches; right, deposit at apex; died in six months.
48	One year; left, deposit to 4 inches; right, incipient deposit; living four months after.
36	Eighteen months; right, deposit to 1½ inches; left, to 6 inches; vomica at apex; died one year after.
45	One year; right, third stage to 6 inches; left, second to 2½ inches; died in one year.
17	Eighteen months; left, first stage to 1½ inches; right, second stage to 5 inches; vomica at apex; died a few months after.
36	Two years; right, third stage to 4 inches; left, third stage to 3 inches; died in two months.
30	Left, second stage to 5 inches; right, healthy; died in eighteen months.
19	One year; right, consolidation, vomica at apex; left, incipient deposit; died in a few months.

Acquired Tuberculosis.—It is evident that proved accidental infection in a strongly resistant individual with a clean family record permits a better prognosis than the reverse condition.

Environment, Habits.—These need no extended discussion. The favorable effect of a good climate and rational home life and surroundings, a full purse, and clean habits are self-evident.

Occupation.—Such occupations as involve the breathing of impure air, lack of sunshine, the inhalation of dust of any kind,

positions that cramp the chest, a sedentary life, or exposure to direct infection are, of course, unfavorable.

Past Illnesses.—All diseases, acute or chronic, that greatly depress the vital forces predispose to tuberculosis. Of acute diseases, influenza is perhaps most potent. Bronchitis and pneumonia are often tuberculous from their commencement. Measles, whooping-cough, and the like may favor the development of a primary infection, or light up some smouldering embers that have formerly escaped recognition. Bright's disease, diabetes, cirrhosis of the liver, degenerative diseases of the nervous system, leukemia, and aortic disease are especially liable to terminate in phthisis. Pulmonary stenosis in persons beyond childhood is said to almost invariably end in tuberculosis pulmonalis; while, on the other hand, mitral leakage or stenosis is believed to exert a favorable influence. The latter statement may, however, be received with some reservations in the light of recent investigation.

Cancer and Consumption.—These diseases coexist in a surprising number of cases if postmortems are to be trusted. Fowler and Godlee report that of 177 cases of obsolete tubercle observed postmortem, cancer was the cause of death in no less than seventy-three cases, or 41.2 per cent.

The questions raised are most interesting, particularly if one considers the fact that, in the family history of persons dying of cancer, tuberculosis is more frequent than is cancer itself—a curious fact, which must have impressed any one who has reviewed a considerable number of such cases.

Syphilis.—Acquired syphilis may be classed with other depressing conditions favoring infection, and many cases of pulmonary syphilis are doubtless wrongly described as tuberculosis. Any existing tubercular process will be greatly benefited by antisyphilitic treatment in the presence of an old or recent syphilitic infection, but will later renew its manifestations upon the old plane.

Congenital syphilis predisposes to the development of tuberculosis, and according to Hochsinger, a combined syphilis and tuberculosis may be directly transmitted from mother to child.*

* "Weiner med. Blätt.," Nos. 20, 21, 1894.

Pleurisy.—Not only must one accept the fact that a considerable proportion of primary pleurisies are merely pleural tuberculosis,* but he must also consider the deleterious effect of subsequent adhesions or the exhaustion incident to an empyema. Osler believes that cases commencing with a pleurisy run, as a rule, a protracted course.

Some Associated Conditions and Complications.—*Dyspepsia.*—A good digestion is the consumptive's sheet anchor, and should be made a matter of especial inquiry.

PAST DISEASE IN RELATION TO TUBERCULOSIS.

(Combined Experience of Washington Life and National Life.)

Acquired Tendencies to Consumption.	Total Number of Cases.	Deaths from Consumption.	Percentage.	Acquired Taint Alone.			Hereditary and Acquired Taints.		
				Number of Cases.	Deaths from Consumption.	Per cent.	Number of Cases.	Deaths from Consumption.	Per cent.
Blood-spitting prior to insurance, ...	69	27	39.13	50	19	38.00	19	8	42.11
Bronchitis, pneumonia, and pleurisy prior to insurance, ...	202	47	23.27	155	34	21 94	47	13	27.66
Disease of hip, spine, or cervical glands in childhood, ...	20	4	20.00	19	4	21.05	1	0	—
Subject to asthma at the time of insurance, . .	47	14	29.79	38	10	26.32	9	4	44.44
Subject to cough at the time of insurance, . .	24	13	54.17	19	9	47.37	5	4	80.00
Subject to catarrh at the time of insurance, . .	16	6	37.50	11	3	27.27	5	3	60.00
Traces of former disease in the lungs, ...	13	8	61.54	8	6	75.00	5	2	40.00

Dr. A. B. Bisbee's paper.

Anemia.—The state of the blood is of importance in two directions—first, as indicating the virulence of the infection, and, second, as evidence of resisting power or the lack of it.

It ordinarily presents the typical signs of a moderately severe

**Results Obtained by Inoculation of Animals.*—Eichhorst, 62 per cent.; La Damany, 92.7 per cent.; Osler, 31.7 per cent. Of 90 cases followed by Bowditch during thirty years, 32 developed phthisis.

secondary anemia, and the higher the hemoglobin percentage, the better is the prognosis.

Albuminuria.—This condition complicating a tuberculosis may take any one of three forms—parenchymatous nephritis, interstitial nephritis, or tuberculous nephritis. The three conditions occur with about equal frequency, and affect the prognosis very unfavorably. The extent of the added impairment depends upon the form and stage of the renal disease.

Laryngeal Tuberculosis.—As a primary condition this is extremely rare, and when found strongly suggests an *advanced* pulmonary lesion.

Pneumonia.—An intercurrent pneumonia usually accelerates the course of the disease.

Diarrhea.—A history of recurring diarrheal attacks means a speedy and fatal termination in most instances.

Pneumothorax.—The occurrence of this complication reduces the expectancy to less than one year.

Hemoptysis.—Repeated attacks of hemoptysis constitute an unfavorable sign, though one meets with individual cases of chronic ulcerative phthisis in which they have recurred at intervals during twenty-five or thirty years. Hemoptysis occurs at some stage in from 60 per cent. to 80 per cent. of all cases.

"Blood-spitting" *arises* from tuberculosis in from 80 per cent. to 90 per cent. of all cases, and one can adduce no better example of the increased hazard involved than the following tables kindly furnished by Dr. A. B. Bisbee, of the National Life of Vermont.

RELATION OF HEMOPTYSIS TO CONSUMPTION.

(Combined Experience of Washington Life and National Life.)

Interval Between Spitting of Blood and Time of Insurance.	Number of Cases.	Deaths from Consumption.	Percentage.	
One year,	4	3	75	
Two years,	5	4	80	
Three to five years,	19	9	47.37	54.76 per cent.
Six to ten years,	14	7	50	
Eleven to twenty years,	15	2	13.33	
Twenty-one to thirty years,	12	2	16.67	14.81 per cent.

DEATH-RATE FROM CONSUMPTION.

(Combined Experience of Washington Life and National Life.)

	Number of Cases.	Deaths from Consumption.	Percentage.
Acquired tendencies,	391	119	30.43
No acquired tendencies,	3396	536	15.78

Body Temperature.—The character and degree of pyrexia are of the utmost importance in the prognosis of pulmonary tuberculosis. The most important is the temperature *range.*

Continued fever, or one with slight remission, suggests the active invasion of new areas.

Inverse temperature—i. e., high morning and low evening record—is usually associated with a virulent infection or poor resisting power.

Marked evening rise, with normal or slightly subnormal morning temperature, is the common type, and merely indicates an active toxemia. With night-sweats it, of course, suggests a process of softening or actual cavity formation.

The apparently favorable fact that at no time of the day does the temperature greatly exceed normal must always be checked by a comparison of the highest and lowest temperature; not infrequently the morning temperature is far below the normal, and any such wide range is an unfavorable sign.

Absence of Fever.—On the other hand, a normal temperature is a favorable sign, indicating usually that no active process is at work and no toxemia present. Associated with absence of cough and sputa and a gain in weight and color, it indicates "arrest."

The Rate of Progress.—The condition of the lungs relative to the known duration of the disease is of great moment as indicating the probable rapidity of further invasion.

Individual Predisposition.—The question of individual predisposition to phthisis is extremely interesting. Under the "Rôle of Inspection in Diagnosis" will be found a description of the physical conformation of those who show the "habitus phthisicus" of Hippocrates, and predisposition through inheritance has been discussed under heredity. It can not be doubted that there are at least two distinct and recognizable physical

types that furnish a kindly soil for the development of the bacillus of tuberculosis, and that in the larger proportion of such individuals the resistance is slight, an inherited structural defect and a constant powerful and depressing mental influence tending to make their fight result in speedy and certain defeat.

THE ACCEPTANCE OF APPLICANTS PRESENTING ALBUMINURIA AS A SYMPTOM.

Albuminuria impairs the life.

As has been stated elsewhere, all persons presenting albuminuria as a symptom must be classed as impaired lives, the degree of impairment and its duration depending upon the source of the albumin and the associated symptoms. One of the most illuminant of recent discussions upon this subject is that which took place at the meeting of the Association of Life Insurance Medical Directors held in 1891.

Functional albuminuria.

Dr. William B. Davis, Medical Director of the Union Central Life Insurance Company, in a paper entitled "Albuminuria in Persons Apparently Healthy, and a Consideration of Its Relation to Life Assurance," gave an admirable summary of the literature bearing upon the question of so-called "functional albuminuria," pointing out the fact that it might be classified under four heads :

(*a*) Dietetic.

(*b*) Due to extremes of temperature.

(*c*) Muscular activity and fatigue.

(*d*) Mental strain or violent emotions.

Relation to extremes of temperature.

Some peculiar cases were quoted, such as that of the individual who always found albumin in the urine after a meal of buckwheat cakes. In another case altitude determined albuminuria ; in yet another the excessive use of tobacco was reported as a cause ; and Dr. E. W. Lambert, of the Equitable, made the interesting statement that in the office of his company examinations conducted since 1876 had shown a definite and marked increase at certain seasons of the year in the number of persons rejected because of albuminuria, such increase being directly associated with the extremes of temperature. When the mercury stood at zero or below, and at or above 90° F., the reports of albumin increased from two per cent. to five per cent. The paper as a whole made a strong presentation of the case of functional albu-

minuria, yet the following conservative rules were suggested by Dr. Davis as applicable to the acceptance of persons presenting this symptom.

Rules of Acceptance as Suggested by Dr. Davis.—

"1. There should be nothing in the family history indicative of heredity of Bright's disease, and there should be no symptom of renal disease in the personal history except albuminuria. — Family history.

"2. The candidate should be under forty years of age, in good health, and there should be no history of gout, rheumatism, syphilis, lead-poisoning, nephritis, intemperance, chronic dyspepsia, or dropsy. — Age.

"3. There should be no indication of hypertrophy of heart or increased arterial tension, no accentuation of the aortic second sound, and no palpitation or dyspnea. — Vascular system.

"4. There should be no retinal changes. — Fundus oculi.

"5. The color, density, and quantity of the twenty-four-hour urine should be normal, or it may be darker in color and heavier in density. — Color.

"6. The specific gravity of the twenty-four-hour urine should not be below 1.020. It may range from 1.015 to 1.030.* — Specific gravity.

"7. The precipitated albumin should not exceed one-eighth (1/8) of the urine. — Amount of albumin.

"8. There should be a period of the twenty-four hours when the urine is free from albumin. — Persistence of albumin.

"9. The urine, as a rule, should contain no tube-casts. When, however, the specific gravity and quantity of urine are normal, the presence of a few hyaline casts has no serious import. — Tube-casts.

"When the above conditions have been met, and we are convinced of the ability of the medical examiner, and are satisfied with the completeness and carefulness with which the investigation of the case has been made, I think we can safely approve the candidate for a *short endowment policy*. — Confidence in examiner's report. — Short endowment only.

"To a person who has passed the above gantlet and been subjected to a rigid medical examination this action will doubtless appear illiberal: but *until the clinical significance of album-*

* There can be little doubt that in many of the cases of so-called functional albuminuria associated with high specific gravity a serious *cardiac* lesion has been present, though without valvular murmur.

inuria in persons apparently healthy has been finally determined by observations upon one full generation, we can not and probably ought not to expect life-assurance companies to do any better for them."

Always a grave symptom.

The discussion of this excellent essay was participated in by a large number of the medical directors of prominent American companies, and these gentlemen were united in their opposition to any theory that would make albuminuria of any sort a trivial symptom. Dr. Frank Wells pointed out the fallacy involved in the use of the term "functional" as applied to albuminuria occurring after violent exercise, and quoted cases that illustrated the danger attending the acceptance of risks presenting a supposed functional albuminuria.

Dr. Lambert's opinion.

Dr. Lambert referred to several illustrative cases that would have involved early loss to the company, and put the situation aptly in the following words: "I think this question of albuminuria is a broader and a deeper one than the mere question as to what the subjects will die of. It seems to me that albumin in the urine is an indication of something wrong with the physical condition of the individual, and that it is the red flag of danger, bidding us go very slowly. *I will admit, and I believe that there are cases where albuminuria does not mean any more than a cold in the head, and I will admit that there are many cases where the subjects live on in spite of albuminuria, but I can not yet discover any means by which I can distinguish between the case where the subject is going to live and the one where he is going to die early.* We have been examining the urine of all applicants since 1876, and I am now having the cases which have been rejected for albuminuria looked up, and out of the number of cases from 1877 to 1890, *forty per cent. are dead.* Now, this is a larger mortality in thirteen years than we want in our insured, *and while the subjects may not have died of albuminuria, they have died,* and since it is my object to decline men who die unduly early, I am very much afraid of men who have albuminuria, unless I can feel certain that it is some temporary passing condition which induced it."

Represents general attitude of insurance companies.

This statement may be considered as representing the general attitude of the American insurance companies at the present time. Nearly every man participating in the discussion of Dr. Davis'

paper was able to report cases of early loss following the acceptance of persons showing a supposed physiologic albuminuria.*

The foregoing discussion of the three leading diseases will serve to illustrate the difficulties that must inevitably be encountered in the attempt to establish a scientific basis for the rating of impaired lives.

It may be interesting to consider, also, some of the actual ratings of the English insurance companies, and the reader is reminded of the fact that their rules are purely empirical, that they are not uniform, and can not, therefore, be considered as representing absolutely equitable ratings. Under present conditions a man may be accepted without an addition in one office, offered an endowment policy in another, and be heavily rated up by yet another. As a result of this unfortunate system an applicant can go about from one office to another, selecting the terms that appear most favorable, and it has been humorously suggested that he should, if possible, search for a company whose medical officer has a family history or personal flaw which reflects that of the applicant, and so profit by the natural and almost unavoidable bias of that official. The subject will be briefly reviewed in alphabetic order: †

Albuminuria.—

Cases illustrating special rating by British companies.

CASE 1.—Age fifty. Several attacks of gout in feet. Albumin, a trace.

Rating.—Ten years additional.

CASE 2.—Young man, age twenty-three; no occupation. Family history negative. Slight albuminuria.

Rating.—Twenty-five years additional.

CASE 3 is quoted from Pollock and Chisholm's book, and shows a somewhat remarkable rating. Occupation, solicitor; age forty-four. Mother died at age of forty-seven of angina pectoris. Applicant is somewhat obese, his height being 5 feet 7½ inches, weight 196 pounds. He had syphilis at nineteen, has hypertrophy of the heart, and chronic Bright's disease.

* The excellent paper of Dr. Brandreth Symonds upon the same topic covers the question in much the same manner.—"Am. Jour. of the Med. Sci." for 1898, p. 337.

† The reader will find some interesting and extreme examples of extra rating in a paper entitled "Extra Rating of Unhealthy Lives," E. Symes Thompson, M.D., F.R.C.P., "New York Medical Examiner," April, 1900, p. 110.

Rating.—*Thirteen years* additional.

The next case, also quoted from Pollock, seems to offer a contrast in rating:

Case 4.—A police magistrate, age forty-one, of normal weight, with negative family history, suffered from rheumatism and inflammation of the kidneys in 1879. Albumin present.

Rating.—Nineteen years additional.

Established Bright's Disease.—It is evident that in cases of well-established Bright's disease insurance can hardly be offered at *any* acceptable premium, save in cases of interstitial nephritis or in those curious cases of cyclic albuminuria which have served as a basis for much discussion in years past.

In this connection the most important factors are the heart and blood-vessels, the family history, the urinary sediment, the appearance of the fundus oculi, and the general nutrition of the patient. *There can be no doubt that a contracted kidney is compatible with a long life, but this does not prove that such cases endure long after they are detected by the physician.* Cases showing ocular signs and waxy casts die usually within the year.

Impossible to rate drunkards.

Alcohol.—The excessive use of alcohol is almost beyond rating, so difficult is its detection and so widely varying are its effects. The kind of stimulant taken, when, and where, the occupation, environment, family history, and physique are most important; as has been stated in a former chapter, an hereditary taint is extremely unfavorable. The reformed drunkard is a tremendous hazard; he generally relapses; indeed, if there be hereditary taint, he is almost certain to do so, and it would seem that "Keeleyites" show an especially heavy mortality.

Asthma.—Certain varieties of reflex and easily curable asthma will not be considered, and asthmatic seizures due to aneurysm or other mediastinal tumors, renal asthma, and the so-called cardiac asthma must be differentiated by the examiner.

Age of incidence, tendency, and associations.

True asthma occurs at all ages, 31 per cent. of Salter's reported cases having commenced during the first decad of life. It is markedly hereditary (37 per cent.), and very frequently

associated with tuberculosis in the family record, or with the *actual disease in the individual.* Its natural tendency is toward the establishment of emphysema, chronic bronchitis, and a dilated right heart.

Prognosis.—This must vary with the age, occupation, physique, frequency and severity of the seizures, the condition of the heart, and the hereditary tendency. That asthmatics as a class fall short of the normal expectation is undoubted, and, taking all cases, their term of life is probably reduced by nearly one-half, and the average extra should be so calculated.

Expectation reduced one-half.

The selected cases, with a clean record showing marked vitality, well-developed chests, firm muscles, and a sound heart, the occupation being favorable and the attacks infrequent, often live to old age.

Selected cases.

Gout.—Gout is usually quite heavily rated. In one case quoted by Pollock, a man aged sixty-two, suffering from gout and gouty bronchitis, is rated up eleven years; another, aged fifty-four, with well-marked gouty constitution, is rated up only three years. Another, aged forty-seven, with family history of apoplexy, florid, and with a hard pulse, receives but seven years addition.

Heart Lesions.—The rating of heart lesions is no less remarkable. Some of the English companies reject all aortic lesions; others accept them with heavy extras. Applicants in the twenties showing aortic regurgitation are given twenty-five to thirty years addition; a man in middle age is, in one case, charged 12 £ 10s. per 100 £ in ten payments. In cases of aortic stenosis the rating is, as a rule, much less severe. Young cases showing mitral regurgitation are rated up from eighteen to twenty-five years. It would seem on the face of this that a company would lose money on the aortic regurgitant cases and gain on the mitrals, but the author is not cognizant of any statistics bearing upon this point.

Diverse ratings.

Insanity.—Insanity in the family history, if pronounced, should limit to an endowment terminating at fifty-five (Heron).

Marine.—Mercantile marine officers, "in more favorable times," ten shillings per cent. extra—*i. e.*, ten shillings per 100 £ (one-half of one per cent.).

Military and Naval Risks.—If rated at all, the extra should

begin with the initial premium, and remain unvaried both in war and peace.

Gresham rates for officers aged thirty are 8s. 8d. per 100 £; aged forty-five, 3s. 9d. per 100 £.

The question of increased or diminished mortality due to modern tactics and armament, naval and military, should naturally modify the Gresham rates. Long-range tactics must inevitably increase mortality among officers by enabling men to pick their object.

Obesity.—Increased ratings to cover overweight correspond, as a rule, to an addition of from three to ten years in the case of applicants above forty years of age.

Invites degenerative diseases.

Obesity is unfavorable because of the lack of resistance shown to acute diseases, and the increased liability to chronic degenerations or diseases due to faulty metabolism. Its frequent association with habitual overeating and alcoholic indulgence must be borne in mind. Obesity in young persons, or that which comes on rapidly, is peculiarly unfavorable. In such, fifteen years additional is suggested by Dr. Heron; in the more favorable cases an endowment terminating at sixty.

TABLE SHOWING THE NUMBER OF ACTUAL AND EXPECTED DEATHS AMONG OBESE PERSONS.*

	Actual Deaths (Stout Persons).	Expected Deaths (Healthy Males).	Percentage of Actual to Expected.
Disease of the urinary organs,	6	3	200
" " digestive organs,	14	8	175
" " circulatory system,	10	7	143
" " respiratory organs,	12	9	133
" " brain and nervous system,	16	14	114
" " uncertain seat (tumor),	1	3	33
Zymotic diseases,	8	10	80
Sudden and violent deaths,	3	4	75
Tuberculous disease,	0	8	0
Causes not classified,	4	2	200
Total,	74	68	100

Residence in Tropical Countries.—This has now become an important question with American companies. There are

*"Extra Rating as a Statistical Problem," George M. Low, F. S. A., F. R. S., E.

two methods of rating—twenty shillings per cent. per annum, or twenty-five shillings per cent. for five years and ordinary rates thereafter.

The West Coast of Africa is heavily rated at five per cent., and elsewhere the addition is modified to correspond to the varying morbidity of the different regions.

Syphilis.—Broadbent would always rate up at least five years. The general rules have already been discussed. (See Syphilis.)

Tuberculosis.—The actual rating of cases of established but latent tuberculosis varies widely, running from an addition of from ten years to as high as twenty, such rating applying to risks of thirty-five or more years of age; on the younger ones, the rating would have to be greatly increased. As regards rating upon basis of family history, no definite rules can be laid down at the present time, the widest differences prevailing in the various offices and ratings, running from an addition of five or six years in favorable and older lives, to twenty-five years addition in the younger lives. Pollock and Chisholm give the following:

CONSUMPTION IN THE FAMILY HISTORY.

(*A*) *One death only in the family from consumption:*

(*a*) If the life be not under thirty, an acceptance at the ordinary rate may very frequently be granted. If the death be that of a parent, it is necessary, however, to have regard to the age at death, as there is often a family tendency for hereditary disease to set in about the same age. — Applicant aged thirty or above.

(*b*) If the life be under thirty, an extra can not ordinarily be dispensed with, and the amount of extra will increase as the age descends. As a rule, it is not worth while to add less than ten years extra at the age of twenty, and if the occupation be slightly unfavorable,—*e. g.*, a clerk or schoolmaster,—fifteen or more years might be added; while, on the other hand, if the death have been that of a brother or sister about the age of puberty, a smaller extra, five or seven years, will suffice. — Applicant under thirty.

(*B*) *Two or more deaths from consumption, being father or mother, and not exceeding one-fifth of brothers or sisters:*

(*a*) If the life be not under forty, and have passed the age at which his relatives have died, it may be possible in many cases to dispense with an extra even here. Certainly this may be done, acting under the above qualification, if the life have attained forty-five or fifty. — Applicant aged forty or above.

(*b*) If the life be between ages thirty and forty, an extra of from five to seven years will probably cover the risk. — Between thirty and forty.

(*c*) If the life be between ages twenty and thirty, an extra of from ten to fifteen years at age twenty, diminishing to five or seven years at age thirty, will probably be required. — Between twenty and thirty.

(*C*) *Father or mother, and not exceeding one-third of brothers and sisters, dead from consumption:*

Age forty-five and above.

(*a*) The same considerations that are stated in paragraphs *A* and *B* must be attended to, and if the life have attained age forty-five, an acceptance may be granted at the ordinary rate.

Age under forty-five.

(*b*) At ages younger than forty-five it will be important to consider family resemblances—whether the proposer be of the type of those who have survived or those who have succumbed; and in this class of cases an inquiry into the causes of death of the grandparents, aunts, and uncles is likely to throw an important light on family peculiarities as regards tendency to disease, and should always be made.

Age thirty to forty-five and under thirty.

(*c*) Between ages thirty and forty-five an extra, varying from five or seven to ten years, according to circumstances and age attained, will frequently meet the risk. Under the age of thirty the circumstances are likely to be so special that no rule can be laid down or even suggested.

(*D*) *Both parents, and not exceeding one-half of brothers or sisters, dead from consumption:*

Age fifty and above.

(*a*) Here we enter on a class of cases which, in many instances, it will be necessary to decline. If, however, the life have attained age fifty, an acceptance may often be granted, sometimes even at the ordinary rate if there be indications that the life has survived by inherent strength of constitution, like the solitary oak in a forest that has perished.

(*b*) If the life be under fifty, it is impossible to lay down any rule, as everything will depend on the personal history, build, and occupation. It must, however, be constantly borne in mind that the younger the age, the greater the danger.

Vaccination.—Insurance companies should demand vaccination or exact a substantial extra, no less for the safety of their company than for the moral effect, and the great influence exerted upon sanitation in general.

Every backward step such as is represented by the "conscientious objector" is an indirect blow at the insurance interests and the welfare of the general public.

As to what method of rating or form of policy is best adapted to the various classes of substandard risks, it might be said that to the diminishing hazards the lien policy seems especially applicable, while the endowment is especially well adapted to the insurance of increasing hazards.

In closing, it is only necessary to say that in America the insurance of substandard lives is yet in its infancy, and opinion is greatly divided upon the question of the practicability and advisability of issuing such insurance at the present time. The burden of proof would seem to rest upon the shoulders of those who maintain the affirmative of the proposition.

ATTEMPTS TO DEFRAUD INSURANCE COMPANIES.

The accounts of actual cases of insurance fraud, either attempted or consummated, strengthen one's belief in the old saying that "truth is stranger than fiction."

Their Great Diversity.—Lying, misrepresentation, substitution, forgery, suicide, or murder has each a prominent place, and in the light afforded by such cases, the questions asked by an insurance company concerning identification assume for the examiner a real meaning. He sees at once the necessity for a careful report concerning such apparently trivial matters as the color of the eyes and hair, the presence, form, and location of scars and deformities, and better appreciates the value of an inquiry concerning the total amount of the applicant's insurance and his moral status.

Identification.

He sees, further, that it is absolutely necessary that the examiner be satisfied as to the identity of the man or woman he may be called upon to examine. By acting intelligently and conscientiously he can do much to protect the company from fraud, and, indeed, in most instances where "graveyard" insurance has been effected, the agent, examiner, and one or more others have been in collusion.

Insurance frauds are not nearly so common now as formerly, because at the present day a beneficiary must show an insurable interest, and for the additional reason that the inspection of risks and the investigation of death losses are much more thorough than was the case a few years ago.

Insurable interest.

In the days of speculative insurance a person could insure the life of any one for his own benefit, and there was ever present a powerful incentive to crime.

Speculative insurance.

MINOR FRAUDS.

Before taking up the major frauds, it may be well to consider some that are minor.

Direct Falsehood.—The commonest method of defrauding insurance companies is not in the least degree dramatic, and is interesting only to those pecuniarily involved and their respective attorneys. It consists in the concealment of vital facts—in other words, lying. The average man's moral sense is peculiarly blunted when he applies for insurance. The mental fieldglass is reversed, and everything unfavorable to acceptability dwindles to insignificance or entirely disappears from the field.

Blunted moral sense.

"Poor memories."

Previous rejections are forgotten; a recent attack of pneumonia fades into an insignificant "cold"; the loss of sisters and brothers known to have died of tuberculosis is credited to the dire effects of "overwork," "grief," "female disease," or "malaria"; an attack of "delirium tremens" may become "nervousness from overwork." "Twenty or thirty drinks a day" become "an occasional drink," or permit the applicant to denominate himself as "very temperate," or even "a total abstainer." "Inflammatory rheumatism" is metamorphosed, and "slight muscular" may appear in its stead.

There is a remarkable amount of such petty fraud, but our limited space must be devoted to those cases which have some element of peculiar interest.

MAJOR FRAUDS.

We shall consider:

1. *Substitution, false personation, and mythical insurance.*
2. *Forgery.*
3. *Simulated death.*
4. *Graveyard insurance.*
5. *Mysterious disappearance.*
6. *Suicide.*
7. *Homicide.*
8. *Self-mutilation.*

SUBSTITUTION AND MYTHICAL INSURANCE.

Requires accomplices.

"Substitution" and "mythical" insurance invariably require the joint action of several individuals, and in consequence are sooner or later detected in most instances. Sometimes, however, the companies are swindled extensively before the criminals are run to earth.

The Bond family.

One of the most curious cases of absolute fraud is that in which the Bond family of South Carolina were the chief actors.

This family contained an insurance agent, a doctor, and a free-lance whose particular function was to furnish dead bodies to suit the demands of the nefarious business. For a time these rascals had everything their own way, yet the procedure was simple. The insurance agent wrote a fictitious application, the doctor filled in the examination blank in any way that his imagination suggested, and, between them, the trio executed the necessary signatures. Whenever they decided that a death and a funeral were due, they secured a lodging, placed an accommodating female therein to play the part of the widow, and announced to the neighborhood that the mythical husband was sick, and that the doctor had grave doubts concerning his recovery. After a decent interval the death was announced, and in the mean time brother number three had brought to the house a purchased or "resurrected" corpse, and the rest was plain sailing. These scoundrels finally placed insurance upon one "Jim Brown," who turned out to be a yellow dog. Why they took the trouble to insure a live dog seems difficult to explain, unless it be considered as an evidence of their humorous bent; and, furthermore, in spite of the fact that they realized from their crimes a sum amounting to nearly $100,000, they displayed a very frugal, not to say niggardly, spirit in using one corpse no less than five times. They were finally brought to trial and their crimes fully proved.

"Jim Brown."

FORGERY.

Forgery enters into the greater part of insurance frauds to some extent, but in certain cases the whole certificate of death has been forged by the beneficiary of the policy, who has thus attempted to secure the insurance while the insured was still alive.

FEIGNED DEATH.

One of the earliest instances of such a crime is related in the "Annals and Anecdotes of Life Insurance," by Francis. He, indeed, considers it to be the first case.

Father and daughter.

It would appear that in 1730 there resided in a remote London suburb a man and a woman who were supposed to be father and daughter. After a time, and late at night, the father summoned in haste a neighbor's wife, saying that his daughter had been suddenly taken ill with a severe pain "at the heart." A physician came at once, only to find the patient in her death agony. He stood by the bedside, felt her pulse, shook his head sadly, and departed. The searchers performed their office and reported the death; a funeral was held, and "the coffin with its contents was committed to the ground." It transpired later that the daughter was insured, and the money was paid to the father, who thereupon left for parts unknown.

The "Macaroni" and his mistress.

Shortly after, in a more fashionable locality, there lived a very dashing gentleman, affecting what Francis calls the "macaroni style," with a woman supposed to be his mistress. After a time this woman became suddenly ill of heart pang. Again a physician arrived too late to minister to the living, and again there was insurance money to be collected.

Uncle and niece.

Then the scene shifted to Liverpool, and the chronicle states that there dwelt in that city a corn and cotton merchant, respected, wrapped up in his church duties, and devoted to a niece who conducted the affairs of his household. By a business subterfuge an insurance of £2000 was placed upon the life of this cherished relative. Then the same dreadful scenes as have been previously described were reenacted in every detail, save that on this occasion the funeral was public, and many friends visited the house and viewed the corpse.

The insurance was again collected, though with a deliberation that appeared like the indifference born of grief, and later, but only under the advice of a physician, this chameleon-like scoundrel sought other climes.

If this chronicle be true, it would indicate that the woman was a cataleptic, and that physicians and searchers were probably privy

to the fraud. Francis does not tell us what became of the criminals.

True or not, it is a good story, and illustrates well the possibilities of this phase of the subject.

GRAVEYARD INSURANCE.

Graveyard insurance was formerly a common means of defrauding companies, and even in late years several clever conspiracies have been unearthed. One or two of them will suffice to illustrate the general method of all.

The North Carolina Cases.—The North Carolina cases (1895) are perhaps the most interesting. As Lewis and Bombaugh say in their entertaining and instructive volume :* "The cases reported were so numerous, so varied in character, and so ingenious in plot and execution that, if they were detailed at length, they would furnish material for the most interesting chapter in the history of graveyard insurance.

Graveyard risks.

"It seems incredible that such a multitude of paupers could be insured for large sums, that so many negroes could be passed off as whites, that intelligent invalids and cripples could be used for speculative purposes without knowledge or suspicion, and that the plainest requirements of insurable interest could be so long disregarded and defied."

Hassell.

A rascally crew was headed by an intelligent and plausible desperado named Hassell. Thirteen of the gang were ultimately brought to trial, seven being white and six colored. Seven companies were interested.

The late Dr. Delamar.

Hassell and three of his associates established an insurance agency at Beaufort, N. C., and actually employed solicitors to hunt up such persons as were either through old age, illness, or bad habits likely to become early losses to a company. One of the gang was a Dr. T. B. Delamar, who acted as medical examiner. His reports are said to have been invariably favorable. Among those recommended by this scoundrel was a negro convict reduced to beggary, and at death's door from consumption. Another applicant was almost dead from lifelong dissipation, while yet others were both diseased and broken with

* "Stratagems and Conspiracies to Defraud Life-insurance Companies," Baltimore, 1896.

age. The trial judge stated that if Delamar were prosecuted upon all the cases of forgery in which he was implicated, he would be sent to prison for one hundred and fifty years.*

The Murder of Martin Callahan.—Murder was, of course, frequent in connection with such cases. Old Martin Callahan, of Scranton, Pa., was insured for $1000 and murdered nine days later. A poor old man in Lebanon County, Pa., was insured for $30,000 by six villainous rascals and then thrown into a stream. As he did not drown promptly enough, the gang jumped in after and upon him and held him under water until he was dead.

MYSTERIOUS DISAPPEARANCE.

Simplicity of procedure.

This makes a most interesting chapter. The procedure is simple. A man insures his life and then disappears under circumstances that suggest death by accident or violence. Drowning is the favorite method. The case of Sargent *vs.* The Traveler's Life is an interesting example of this kind of fraud.

A bridal party.

The Sargent Case.—A man styling himself J. H. Sargent came to Beloit, Wis., from Rockford, Ill. (1865), with a woman calling herself Mrs. A. E. Follett; on the morning after their arrival they were married by a minister, and immediately after the ceremony Sargent applied to a local agent for an accident policy for $3000, which was at once written and delivered to him. In this policy his wife was made the beneficiary. Thirty days later the company was notified that, while skating with three other men, named, respectively, Allen, Corwin, and Hill, Sargent had fallen through an air-hole and been drowned. Allen, Corwin, and Hill furnished affidavits as to the facts, and the agent, after investigation, recommended payment of the claim, but the officers of the company were wary and delayed settlement. Suspicion had been aroused by the fact that the character of the parties concerned was bad, and that it seemed odd that Sargent, a benedict of only four weeks' standing, should, after spending all that time away from home, as was claimed, have gone skating before even calling upon his bride. They believed him to be

The bridegroom drowned.

* After a short term of imprisonment Delamar was pardoned on the ground of fatal disease, and died shortly after.

alive, but could not find him. They then found a signature in which he had transposed his initials, writing H. J. Sargent instead of J. H. Sargent, and it occurred to them that Allen's initials were H. J., and stronger suspicion fell upon him; moreover, his writing was found to correspond to Sargent's signature upon the hotel register at Beloit. At the trial the widow betrayed a woeful ignorance of her husband's antecedents or birthplace, and could not even give the names, or indeed any facts, relating to his family. When asked to describe him, however, she drew from her bosom a photograph, which was examined by the court, and duly sworn to as a correct likeness of the deceased by the other witnesses, Allen, Corwin, and Hill. This was a fatal move, for a secret agent was at once despatched to the photographer whose name appeared on the picture. A fatal move.

The clergyman, hotel clerk, insurance agent, and several others identified Allen as the man who was married and insured under the name of Sargent. Thus the trial dragged on until, upon the fourth day, a witness appeared who stated that he was a photographer from Illinois, that he had taken the photograph introduced in evidence, that it was not the likeness of Sargent, but of James Clure, a tailor, living in Batavia, Illinois; that Clure was not only alive, but that the witness had seen him an hour before he came into court. He was followed by Clure himself, who swore to his photograph, and stated that he had sent it to Allen about two weeks prior to the trial. The case against the company was then dropped, and Allen and his spouse were duly indicted and convicted.

Case of J. L. Clement.—In 1874 Mrs. J. L. Clement, of Brownfield, Maine, brought suit against the Economical Life Insurance Company for money claimed to be due under an insurance policy for $5000 on the life of her husband, who disappeared on the evening of October 3, 1871. According to the statement of a man named Hartford, he and Clement were returning from Cornish, each driving his own team, Clement being in the lead. When they reached a point where the road skirted a bluff of the Saco River, Hartford heard ahead of him a noise, a splash, and cries for help. When he reached the spot nothing was to be seen of Clement; the wagon and the body of the horse were found in the river, and a hat supposed to belong to Clement

in the road. Shrewd detective work enabled the company to prove that the horse had been backed over the bank, and had been dealt a heavy blow between the eyes; that the hat found in the road was placed there by Hartford; that Clement had left the place of his supposed drowning. The last fact being established, a careful examination was made of the footprints about the scene of the supposed accident. Clement was lame in the left foot, and his track was thus easily recognized, and led away from the river. It was further shown that he had been seen since the date of the supposed accident. A verdict was given for the company.

Telltale footprints.

Four years later another suit was brought. It then developed that for a time Clement had hidden in the woods, but the same fatal track had been seen and recognized. He was then traced to Blue Earth City, Minn., and from there to the Black Hills.

This strongly suggests Doyle's story, "The Boscombe Valley Mystery," in which that remarkable amateur detective, "Sherlock Holmes," after examining the scene of a murder, announces with great positiveness that the murderer was a tall man, left-handed, lame in the right leg, wore thick-soled shooting-boots, smoked Indian cigars, used a cigar-holder, and carried a blunt penknife in his pocket.

There are, in fact, many actual examples of detective work quite as shrewd as anything ascribed to Doyle's hero.

The Dillon Case.—Dillon, of North Carolina, pretended to drown, and took to the woods. After five months he found a floating body in the river. He removed the hair, and, plucking out his own and his beard, inserted those hairs into the scalp and face of the dead man.* He also knocked out two of the teeth, and dressed the mutilated remains in clothes that he had worn on the day of his disappearance. As a result of his ghastly but ingenious plan the corpse when found was identified as that of Dillon by no less than twenty-five people. Failing to secure the insurance money, Dillon returned home a few months later.

SUICIDE.

Pythagoras, Apuleius, Aristotle, and Plato.

In early times opinion was divided concerning this crime. Pythagoras earnestly protested that "it was a crime to leave

*Lewis and Bombaugh, p. 151. The story seems somewhat apocryphal.

one's station without the order of the Great Commander, God." Apuleius said that the wise man threw off his body only by the will of God. Plato himself taught the same doctrine, and Aristotle condemned suicide as being an injury to the State.

Cato, Pliny, and Seneca.

On the other hand, Cato and the Stoics believed that every man's life was his own to do with as he pleased, and Pliny found proof of the goodness of Providence in the fact that the world had been filled with herbs by means of which the weary could find a rapid and painless death. Seneca, too, found comfort in the contemplation of this crime, and said: "Live if life please you; if not, you have the right to return whence you came."

A social event in decadent Rome.

Suicide became terribly prevalent in the years of Rome's decadence, and men frequently made a social function of their carefully planned deaths, opening their veins and expiring happily amidst a group of their friends and relatives, to the accompaniment of sweet music, and in an atmosphere heavy with the perfume of flowers.

Even under Christianity suicide flourished for a long period, but to-day the teaching of Plutarch governs the civilized world, and one preaches and believes that the noblest and greatest courage is shown by the endurance of suffering, and that suicide, being flight, is an act of cowardice, in the perpetration of which a man sins against himself, his State, his family, and his God.

An act of cowardice.

Marriage and suicide.

Voltaire asserted that the majority of persons who committed suicide were unmarried. This was undoubtedly true of his time, and remains equally so for our own.

The progress of civilization has been attended by a steady increase in the frequency of the commission of this crime, and it is a curious fact that the poorer the district, the fewer are its suicides. The higher the type of civilization, the richer the country, and the more emotional or mentally alert its inhabitants, the greater is the number of its citizens who take their own life.

This is well expressed by Strahan, who says, "Where civilization is highest, the struggle for life is fiercest, and there we meet with the greatest number of breakdowns. Where civilization is highest, there life is most artificial, and there we meet with the most rapid degeneration of the stock. It is a sad fact that suicide all the world over occurs in inverse ratio to ignorance."

Is a penalty on civilization.

To the untutored savage it is almost unknown, and it increases regularly as we rise step by step through the various grades of civilization. Nor is it self-destruction alone that thus dogs the footsteps of culture; insanity and many other of the worst ills that flesh is heir to take the same course. "They are a price put upon knowledge by nature, and it must be paid."*

Sex.

Suicide is more than twice as frequent in men as in women, and reaches its maximum between the ages of fifty-five and sixty-five.

Jopling is quoted by Walford as saying that out of 511 cases analyzed by the French officials, 20 per cent. occurred by reason of wounded affections, 29 per cent. from disgust of life, 20 per cent. from financial embarrassment, loss of employment, or poverty, and 13 per cent. from dissipation, losses at cards, etc. Walford also states that of 812 English suicides occurring in males, 38 per cent. were by hanging, 27 per cent. were accomplished by throat-cutting or stabbing, 15 per cent. by poisoning, 10 per cent. by drowning, 6½ per cent. by shooting, and 2½ per cent. by throwing one's self from a height. Among females, on the other hand, 30 per cent. were by poisoning and 28 per cent. by hanging.†

Means employed.

In France asphyxiation by coal-gas and drowning are the favorite methods, while in England hanging, and in America shooting, are the most common of the means adopted. May and June are, in most countries, the favorite months. Drowning is especially common in warm weather for obvious reasons.

Suicide and Life Insurance.—The advent of life insurance naturally led to a special application of suicide, and added to the inherent cowardice of the act the element of fraud. The man harassed by business difficulties, worn out by chronic illness, or threatened by the hand of the law, could find in life insurance a means of providing for his family at the expense of a rich corporation. The study of life-insurance frauds reveals some remarkable instances of this kind.

* "Suicide and Insanity: A Physiological and Psychological Study," by D. A. K. Strahan, M.D., London, 1893.

† As regards occupation, the comparative mortality from suicide is extremely interesting. Assuming the mortality for all occupied males to be 15, the comparative figures would be: clergymen 7, barristers 18, inn-keepers 29, file-makers 31, physicians 41 (Registrar-General's Report).

President L. G. Fouse, of the Fidelity Mutual, has pointed out the fact that, while during fifty years the increase in suicides has averaged 30 to each 1,000,000 inhabitants, the increase among insured lives has been much greater. Increase among insured lives.

He says, truly, there can be little doubt that in the case of persons insured under policies containing a suicide clause, such deaths are very generally reported as accidental; and, further, that if this assumption be correct, no less than 4.36 per cent. of the total deaths under insurance policies are due to suicide. False proofs of death.

Even when all policies distinctly disclaimed liability should death be due to suicide, the plea of emotional insanity was generally sufficient to convince a sympathetic jury that justice was on the side of the plaintiff, and only the plainest evidence of premeditation and fraudulent intent sufficed to protect the insuring company. Emotional jurors.

Nowadays, when most of our companies make the policy incontestable after two years, or, as is now proposed by several, incontestable after date of issue, it would seem that suicide as a means of providing for the family must become a very popular procedure.

Illustrative Cases.

One very old and one or two more recent cases may be quoted as showing plainly that a man may for a long period plan and plot to surround the taking of his own life by a chain of circumstances nicely calculated to give to the world the appearance of homicide, he having taken out beforehand insurance sufficient to place his family beyond want.

The Yorkshire Squire.—First of all should be placed that curious story of the Yorkshire squire as told by Francis. Robbed of the graces of style which that gifted writer could so easily command, it may be thus narrated: A hard-riding, hard-drinking, hot-headed, and unsophisticated Yorkshire squire was introduced, through the medium of a business trip, to the temptations and pleasures of London life. The new dissipation, with its inevitable gaming for high stakes, soon exhausted his patrimony, and led him into serious financial difficulties. Seeking to raise money by any and all means, he was finally compelled to insure his life at the usurious rates then in force. A happy marriage took him for a time out of London, but he soon returned and began His ruin.

his old career. He played for high stakes, and lost continually to the sharpers who fooled him to the top of his bent. Money he had none, but his life assurances were assigned, and were quite sufficient security to satisfy those who were fleecing him. Finally, after a thirty-six-hour gambling bout with the usual disastrous result, he returned to his hotel, paid his bill, wrote a note to a stanch friend, walked to the River Thames, where he hired a wherry, and, when in midstream, threw himself into the water and was seen no more.

His death.

His revenge.

When the note was opened, it was found to contain a statement to the effect that, being calm and sane, and realizing that suicide would render void the policies of assurance held as security by the cheats who had ruined him, he had decided to take his own life, and thus at one stroke end an existence which had become insupportable, and compass the revenge which he so greatly craved.

Captain Calvocoresses.—More elaborately planned, and quite different in its intent, was the modern suicide of Captain Calvocoresses, which occurred at Bridgeport, Conn., June 3, 1872.

The Captain was a retired naval officer, fond of his family, highly esteemed in his community, and entitled to the gratitude of his country for his achievements when an officer in her navy. On the morning of June 3d he left his home in perfect health, after a leave-taking that impressed his family as being unusually demonstrative, and on the evening of the same day was found dying upon a street in Bridgeport, with a pistol wound in the left breast, his clothes still burning at the point of entrance of the bullet. The pistol, an old-fashioned affair, lay thirty feet distant with a broken stock, and near the body a sword cane, with bent and splintered sheath, and a sharp bend in the blade exactly corresponding with the shape of the splintered canesheath.

Found dying in the street.

His coat and waistcoat were partly open, as if an assassin had grasped and wrenched them. In a little handbag were found various memoranda, purporting to be a list of valuable securities, and a partial record of various profitable transactions. According to these memoranda he owned $100,000 in bonds. It was, of course, generally believed that the Captain had been robbed and murdered. An investigation showed, however, that not only

Premeditation.

had the Captain in all probability taken his own life, but that the action had been long premeditated, and that its details had been carefully and ingeniously planned to convey the idea of homicide.

False schedule.

The Captain's schedule of assets was shown to be almost wholly false, and it was proved that he had at no time been possessed of more than a fourth part of the sum indicated by the memoranda. It was further shown that a few weeks before his death he had taken out insurance amounting to $195,000, a sum which was quite beyond his means. This amount had been placed chiefly through one agent and in no less than twenty companies, and this despite the fact that the New York Life refused to insure him, and told the agent who conducted the negotiation that the Captain was a poor man and a "fraud."

The Strange Case of Baron Bela Olnyi.—The case of Baron Bela Olnyi is interesting by reason of the peculiar lethal agent employed.

An unfortunate speculator.

The Baron was a wealthy man, and had added greatly to his possessions by a rich marriage, but through unfortunate speculation he lost both fortunes, or at least all of his own and as much of his wife's property as he could obtain. Realizing that he was ruined and disgraced, he promptly undertook to right matters by the perpetration of another fraud, and insured his foredoomed life for 500,000 Gulden for a period of one year. He then entered upon a most peculiar mode of life. Shunning society and all of his accustomed haunts, he spent the whole day and evening in seclusion, no one knowing anything of his whereabouts. At the time his insurance was granted he was a healthy, robust man; soon, however, he began to fail in health, and finally took to his bed and died after an illness of fourteen days' duration. His will revealed to his wife the losses they had both sustained through his mismanagement, and bequeathed to her the insurance money then due.

Poisoned by tobacco.

But payment was refused, and upon investigation it was quite positively determined that the Baron had actually committed suicide by slow poisoning with tobacco, for in his secret rendezvous were found empty tobacco packages in such quantity as to show that the unfortunate man had, during a period of ten months, smoked no less than 3500 cigars and 100 pounds of pipe tobacco.

The defense, of course, urged that smoking of ten to twelve cigars and a third of a pound of tobacco a day could not be held sufficient to cause death, and it must be confessed that many a man is smoking that amount daily without very evident harmful effect. Be that as it may, the Hungarian experts held the contrary opinion, and payment was not made.

HOMICIDE.

The world will never know how many men and women have been done to death that the murderers might receive or share in insurance placed upon their lives. From the earliest days this foul crime has found willing instruments among those whose profit lay in the death of the insured. When, in the sixteenth century, Audley, that villainous usurer and seller of annuities, was asked the value of his office, he is said to have replied, "Some thousands of pounds to any one who wishes to get to Heaven immediately, twice as much to him who does not mind being in purgatory, and no one knows how much to him who will adventure to go to hell." Francis quaintly says, "Charity forbids us to guess to which of these places Audley went."

Audley, the usurer.

In the case of annuities the murderer was likely to be the insured, and there can be little doubt that the enormous profits of certain annuity mongers were made still greater by adroitly executed homicides.

Thus it is said of the Jew, Lopez: "He was well versed in medical lore, he was reputed to possess subtle drugs, and it was often noticed that the healthiest of those to whom he was bound to pay life annuities were sometimes cut off in a remarkable way, and that, too, after they had been closeted with him."

Lopez, the Jew.

"**Kind, Light-hearted Janus Weathercock.**"—No less dark were the insurance crimes of a later period. In the early part of this present century lived "kind, light-hearted Janus Weathercock." Thus Charles Lamb described his friend, Thomas Griffith Wainwright, a pretentious, egotistic fop and woman-killer, who, under the *nom de plume* of Janus Weathercock, wrote light and airy trifles and penciled sketches that charmed the public no less than did his attractive personality. But it is said of him, "It was death to stand in his path; it was death to be his friend; it was death to occupy the very house with him." To make a

Fop, forger, and murderer.

long story short, this talented exquisite murdered his uncle to hasten an inheritance, and poisoned his sister-in-law, Helen Abercrombie, that he might secure an insurance of £18,000 fraudulently placed on her life. He incidentally committed forgery, and while in hiding at Boulogne, in the house of an English officer, insured his host and seduced the daughter. The officer died before the second premium became due. After arrest, trial, and transportation, he twice tried to poison persons against whom he felt animosity. With all the esthetic airs and graces of Bunthorne, with all the artificial superrefinement and deep sensuality of the confirmed egotist, he combined the audacity and heartless cruelty of the instinctive criminal. The child of a degenerate race, he was ever to be "wiled away by new and flashy gauds." After a brief army career he became an idler about town, then, to use his own words, "My blessed art touched the renegade, and by her pure and high influences the noisome mists were purged."

An esthete.

When asked why he murdered "sweet Helen Abercrombie," he seemed puzzled for a moment, laughed, and coolly said, "Upon my soul, I don't know, unless it was that her legs were too thick." Writing to the Governor of Van Diemen's Land, in a vain attempt to secure a ticket of leave, he says, "Take pity, Your Excellency, and grant me the power to shelter my eyes from vice in her most revolting and sordid phase, and my ears from a jargon of filth and blasphemy that would outrage the cynicism of Parny himself."

A strange excuse.

This from the man whose diary is so filled with the records of vile thoughts and deeds as to be unprintable; this the delicate soul contained in the body of a fiend who could watch by the bedside of a fellow convict until he saw the cold hand of death laid upon the sufferer, and then, bringing his great head and its deep-set eyes, which always avoided a frank gaze, close to the face of the conscious but dying man, hiss like some vile serpent, "You are a dead man, you —— ——; in four and twenty hours your soul will be in hell, and my arms will be up to that [touching his elbow] dissecting you."

When this libertine, forger, and murderer was a prisoner in Newgate, he could yet write of himself as "a soul whose nutriment was love, and its offspring art, music, divine song, and still

A forerunner of Oscar Wilde.

holier philosophy"—an egoism worthy of his successor, the notorious Oscar Wilde, a sexual pervert, and leader of a superficial, unnatural, and artificial cult. Wainwright died as he deserved, of a lingering disease and in exile, hated, feared, and despised by all who knew him, and deserted save for one faithful friend, a pet cat, to which he was tenderly attached.

Modern Homicides.

Coming to a still more recent period, we may cite two of the many crimes that illustrate the calculating, cold-blooded villainy involved in the commission of homicide of this type.

Two famous crimes.

The two chosen are those relating to the murder of Kate Ging by Harry Hayward, of Minneapolis, and the multiple crimes of Dr. Herman Mudgett, alias Holmes, of Chicago, Ill. Occurring so recently, they may easily be recalled by many who read these pages.

The writer's acknowledgments are due to President Fouse, of the Fidelity Mutual Life Insurance Company, for copies of his papers relating to the Holmes murders.

Moral anesthesia.

The chief actor in each of these cases was, like Wainwright, a moral monstrosity. The murders were coolly and deliberately planned, and the death of the victim was evidently a matter of importance only so far as it affected the safety and pecuniary advantage of the murderer. Such an emotion as remorse, such a feeling as pity, never for a moment disturbed these murderous fiends. They killed with all the *sang-froid* of the public executioner, without even his care to spare the victim unnecessary suffering.

The Ging Murder.—This will be detailed at some length, because it shows so well the ease with which the most carefully laid plots are unraveled. The chain of crime has always a weak link.

Harry Hayward, of Minneapolis, the son of respectable parents, was only twenty-nine years of age, a man of winning address, and possessed of shrewdness and capacity, though utterly and completely depraved. His victim, Katherine Ging, was a somewhat prepossessing young woman, a dressmaker by occupation, who had by hard work and thrift succeeded in saving a few thousand dollars.

Hayward, with his handsome face and dashing manner, completely won the confidence of this unfortunate woman, and induced her to allow him to invest her money in various undertakings, among others, so it is said, being the purchase of counterfeit money.

Details of the plot.

In some way this polished scoundrel secured her notes for a large sum, which he seemed to be able to increase at his own pleasure. He took every occasion to exhibit large amounts of money, which he claimed were to be invested in business with a certain woman who was to give him her notes secured by insurance policies. He then took Miss Ging to a public restaurant and managed to have her display very freely large sums of money, chiding her in the presence of witnesses for being so indiscreet, and expressing a fear that she might be robbed and murdered.

Insures his victim's life.

He had further persuaded her to take out $5000 life and $5000 accident insurance, nominally as security on the bogus notes. In the mean time he had tried to persuade his brother, Adry, who was evidently a pachydermatous individual, but not without a conscience, to commit the murder that was contemplated. Adry refused, but Harry repeatedly referred to the matter, and outlined various plans of action. Finally, in disgust at what he termed the cowardice of Adry, he announced to him that he had found the man for his purpose in one Claus Blixt. This miserable tool was the engineer of the Ozark Flats in Minneapolis, owned by Hayward senior, a building in which the whole Hayward family lived. Blixt was a Swede, and evidently possessed but a feeble understanding and a large amount of moral obliquity and avarice. Hayward planned every detail of the crime with extremely great care and shrewdness, and drilled his accomplice thoroughly in the part assigned him.

Blixt, the tool.

After considering many plans, he finally decided to have the woman shot under circumstances suggesting highway robbery and murder. When the miserable Blixt grew timid and protested, Harry said, "I would rather kill her than any dog I ever saw; it does me good to kill people." Then he threatened to kill Blixt if he should fail him; and to further terrify him and the more effectually to tie his tongue, proposed to kill Blixt's wife on the plea that he might confide in her and make her a source of danger.

The weapon used.

Giving Blixt his revolver, he attempted to get a receipt for it, but his tool was too wary. Then Hayward proposed that it be tied to the wrist by a string, lest the assassin should drop it and lead suspicion home to the owner of the weapon. Failing in this, he handed it to Blixt and told him that it was loaded with long cartridges that did not fit it but would work "all right." He then handed him the right number of the cartridges properly belonging to the revolver, and told him to change the loading as soon as the killing had been done and he again reached home.

His victim had been induced to hire a horse and buggy and drive to a certain point, where he and Blixt met her. Whispering to her "This man is one of the gang," he pushed Blixt into the buggy, saying that he would meet them at another point and

The alibi.

cautioning them not to allow any one to see their faces. Then the scoundrel rushed back, and when Blixt put a bullet through the brain of his unsuspecting victim, was enjoying a performance at the opera with a very estimable young lady, thus effectually establishing an alibi.

The murder.

Blixt performed his horrible task according to the program, shooting the poor girl through the head at the exact spot indicated by Hayward. Then, after throwing out the body, he turned the horse adrift and returned home. Here he changed the revolver cartridges, placed in the furnace those which he had used, and after putting the revolver under Hayward's pillow, went to his bed.

Poor Kate Ging's body was found at 8.30 P.M. by a passer-by.

Hayward not suspected.

Hayward, known to be her friend and adviser, was consulted by the authorities, and was apparently most anxious to assist in running the assassin down. It was perfectly evident that he had not killed her, and he chuckled in glee as he thought of the clever way in which he had laid his wires. But, as is usual with such degenerates, he had made that great blunder which even the oldest criminals are unable to escape—he had told a third party.

The "weak link."

Three days before the murder Adry Hayward, greatly agitated, appeared at the office of a retired attorney, L. M. Stewart, and told him of the contemplated crime. Mr. Stewart, who knew the boys well, refused to credit it, and evidently persuaded Adry that it was just some "big talk" of Harry's. Mr. Stewart said

afterward that he was unable to believe such a thing possible; that Harry was a great liar and boaster, but he did not dream that he would really commit such an atrocious crime.

As soon, however, as the murder became known to him, Stewart communicated with the authorities, and in a few hours Harry, his brother, and Blixt were under arrest. Adry made a full statement, Blixt confessed, and on December 11, 1895, Harry Hayward swung lifeless from the gallows, and Kate Ging was avenged.

Confession of Blixt.

Execution of Hayward.

Just before his execution he made a full statement or confession, acknowledging that he had been a gambler, had committed arson to secure insurance money, and, further, stated that he was responsible for several murders other than that for which he was to suffer the death penalty. Never for a moment did he express fear, penitence, or remorse.

The Holmes Murders.—On September 5, 1894, a dead body was found at 1316 Callowhill Street, Philadelphia. At the inquest it was determined to the satisfaction of the coroner's jury that the deceased was one B. F. Perry, and that the cause of his death was "burns, received from an explosion, and inhalation of flames." This appeared to close an incident in no way peculiar or uncommon, but one week later President Fouse, of the Fidelity Mutual, received a letter from Jephtha D. Howe, of St. Louis, who, as attorney for Mrs. B. F. Pitezel, of Chicago, Ill., stated that his client believed that the body buried in Philadelphia was that of her husband, B. F. Pitezel, who was insured in the Fidelity under their policy issued November 9, 1893, for the amount of $10,000.

A question of identity.

The company at once commenced an investigation. The application was perfectly regular, and the company's agent stated that Pitezel had invented a coal-bin, that he occupied a desk in an office in which a certain H. H. Holmes had desk room, and had been introduced to him by Holmes as a man who might be willing to take out some insurance.

The fact that Pitezel was living under an alias in Philadelphia aroused suspicion, and President Fouse felt convinced that a dark crime had been committed. The original application described Pitezel as a man 5 feet 10 inches in height, weighing 155 pounds, with chest measurement, 32–35, girth of abdomen, 32;

Conflicting data.

eyes, hazel; hair, black. The body found in Callowhill Street was described by the coroner's jury as that of a light-complexioned person, weight 175 to 180 pounds; mustache, dark red, etc. In short, the descriptions were widely at variance. It was found very difficult to secure proper data for identification until agent Fay suggested that Holmes might be able to furnish the necessary information. Holmes readily agreed to assist so far as lay in his power, and stated that he would be in Philadelphia on business on a certain day and would call at the general office of the company.

Attorney Howe also came as the representative of Mrs. Pitezel, and met Holmes in the Fidelity office. Apparently they were strangers, but actually they were acquaintances of long standing.

The following marks of identification were agreed upon and found to be in accord with the appearance of the exhumed body:

"1. Hair of head straight and black, with no tendency toward curling.

"2. Frontal bone of forehead recedes, with posterior coronal development.

"3. Ridge or abnormal development of nasal bone, being result of injury to nose.

"4. Reddish mustache of stiff, coarse hair, *which he sometimes dyed.*

"5. Upper and lower front teeth even and intact, worn, and stained with nicotin. Has had some of the back teeth extracted.

"6. Mole or wart, same color as skin, on the back of neck, within one inch from center of back, and about next lowest cervical vertebra. The mole or wart is about the size of a pea.

"7. Blood bruise of one of the nails of his thumbs, which caused marked discoloration of the nail.

"8. Enlargement of the tibia below the knee of both legs.

"9. A cut on lower extremity on one of his feet by an ax; exact location of incision is uncertain."

The incident closed.

The coroner's jury, thus reconvinced, declared the body buried as that of B. F. Perry to be actually that of B. F. Pitezel. The company paid the insurance money to Mrs. Pitezel, and to all appearances the incident was closed.

The "weak link."

But again the weak link in the chain of criminality brought

disaster. Within a month the usual thing had happened, and important information was furnished by Marion Hedgepath, a train-robber, then in jail at St. Louis. This man claimed to have been a party to a conspiracy to defraud the company, and the company's officers were certain that he told the truth.

The case was then reopened, but Holmes, Mrs. Pitezel, and her children were nowhere to be found. Finally, after a long and tedious search, Holmes was discovered at Burlington, Vt. Thence he went to Boston, and there he was arrested, and to the surprise of his captors immediately confessed the attempt to defraud the company by the pretended death of Pitezel, who, he said, was still alive, a purchased corpse having been used as a means of securing the insurance. He stated that Mrs. Pitezel and the two children had accompanied him as far as Burlington, Vt., and that the three other children were in Cincinnati with their father.

A misleading confession.

All this was a lie. Holmes had murdered Pitezel and attempted to burn the corpse, and had taken the missing girls to Toronto, where, after having rented a house, he had murdered the children and buried them in the cellar. The partially cremated body of another victim, Howard Pitezel, was found in an Indianapolis suburb.

Holmes kills four.

It was proved beyond a doubt that the father and his three unfortunate children had been murdered by this fiend, and there can be little doubt that Mrs. Pitezel and the remaining children would have been dealt with in like manner had not the strong arm of justice been interposed to shield them. Holmes was convicted and sentenced to death on November 13, 1895.

Convicted.

SELF-MUTILATION.

One of the most astonishing evidences of the extent to which applicants are willing to carry their conspiracies to defraud insurance companies is seen in the frequency of self-mutilation as the basis of fraudulent claims against accident-insurance companies. The reader will recall the fact that nearly all accident policies provide for the payment of a fixed sum in event of certain mutilations; thus for years the companies paid $2500 indemnity to such of their applicants as suffered the loss of their left hand. The large number of claims arising under this particular clause, and the frequency with which they were proved to be fraudulent,

The value of a left hand.

finally brought about a meeting of the different companies in February, 1891. As a result of this meeting the amount of indemnity for the loss of the left hand was reduced one-half, and, *mirabile dictu*, following this action claims for the loss of the left hand fell off 80 or more per cent. It may at first thought seem absurd to assume that a man, for the sake of $2500, would wilfully sacrifice a limb and cripple himself for life, but the proof is ample.

Dr. J. B. Lewis has given a number of very interesting examples of this kind of frauds, and has pointed out the fact that from time immemorial cases of self-mutilation have been attested. Thus, in the days of ancient Rome, when military service was made obligatory, it was not uncommon to meet men who had cut off their own thumbs ; thence, Dr. Lewis tells us, arose the term "poltroon," from *pollux truncatus*. In later years the trigger finger has been shot off or cut away by soldiers desiring discharge, and in the days when the old-fashioned cartridges were in use soldiers would sometimes knock out their teeth in order that they might be rendered unable to "bite cartridge."

The "poltroon."

Accident insurance, and especially its indemnity clause, does undoubtedly breed a great deal of minor and major fraud of a kind very difficult to detect. The author recalls a case in which the applicant carried insurance policies that granted him a weekly indemnity of about three times his earning capacity, and at least twice a year he was laid up, usually from a sprained foot. The injury was genuine, but was induced deliberately, by removing all support to the arch of the foot and jumping to the floor from a height, the patient having a marked case of flat-foot. In another instance a man who possessed the power of spontaneously dislocating his hip made an excellent living by fleecing accident-insurance and benefit companies. Case after case has gone on record which showed conclusively that persons insured under accident policies have placed the foot or hand or both under the wheels of a moving train ; others have lost a hand or foot from the accidental discharge of a gun while hunting. Pretended assaults by burglars have been very numerous. There are certain features common to nearly all of these cases that should attract the attention of the examiner.

Sprains.

Dislocations.

Railroad accidents.

Hunting accidents.

Burglaries.

One of these is the urgency of the patient's desire for ampu-

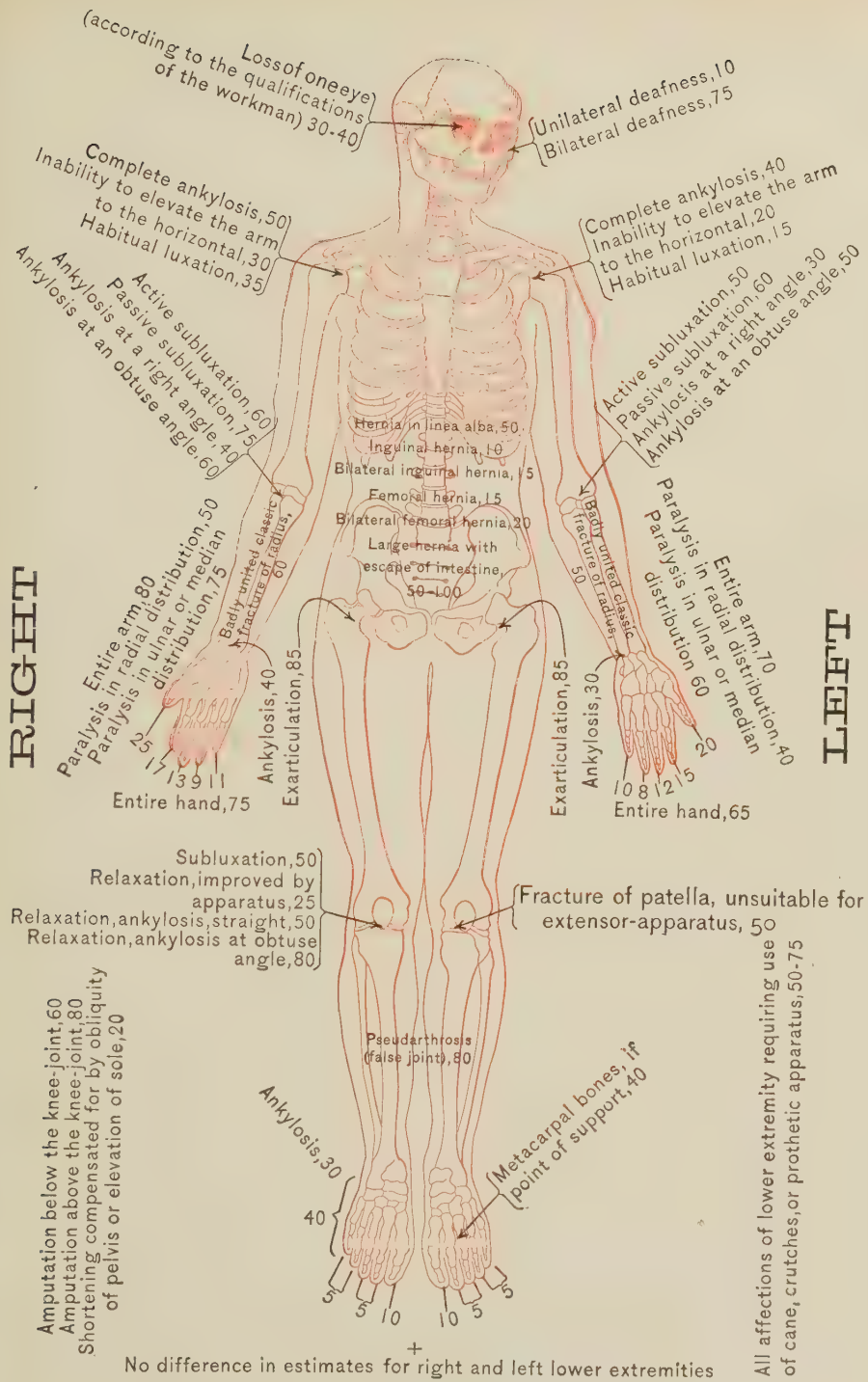

Loss of one eye (according to the qualifications of the workman) 30-40
Unilateral deafness, 10
Bilateral deafness, 75
Complete ankylosis, 50
Inability to elevate the arm to the horizontal, 30
Habitual luxation, 35
Complete ankylosis, 40
Inability to elevate the arm to the horizontal, 20
Habitual luxation, 15
Active subluxation, 60
Passive subluxation, 75
Ankylosis at a right angle, 40
Ankylosis at an obtuse angle, 60
Active subluxation, 50
Passive subluxation, 60
Ankylosis at a right angle, 30
Ankylosis at an obtuse angle, 50
Hernia in linea alba, 50
Inguinal hernia, 10
Bilateral inguinal hernia, 15
Femoral hernia, 15
Bilateral femoral hernia, 20
Large hernia with escape of intestine, 50-100
RIGHT
LEFT
Paralysis, Entire arm, 80
Paralysis in radial distribution, 50
Paralysis in ulnar or median distribution, 75
Badly united classic fracture of radius, 60
Badly united classic fracture of radius, 50
Paralysis, Entire arm, 70
Paralysis in radial distribution, 40
Paralysis in ulnar or median distribution 60
25 17 13 9 11
Entire hand, 75
Ankylosis, 40
Exarticulation, 85
Exarticulation, 85
Ankylosis, 30
10 8 12 15 20
Entire hand, 65
Subluxation, 50
Relaxation, improved by apparatus, 25
Relaxation, ankylosis, straight, 50
Relaxation, ankylosis at obtuse angle, 80
Fracture of patella, unsuitable for extensor-apparatus, 50
Amputation below the knee-joint, 60
Amputation above the knee-joint, 80
Shortening compensated for by obliquity of pelvis or elevation of sole, 20
Pseudarthrosis (false joint), 80
Ankylosis, 30
40
Metacarpal bones, if point of support, 40
5 5 10 10 5 5
+
No difference in estimates for right and left lower extremities
All affections of lower extremity requiring use of cane, crutches, or prothetic apparatus, 50-75

FIG. 99.—G. HAAG'S GRAPHIC SCHEDULE, SHOWING THE PERCENTAGE-LOSS OF EARNING-POWER THROUGH PERMANENT PARTIAL DISABILITY. (Compensation allowed equal to sixty per cent. of disability under the State system of compulsory insurance of workmen.)

Characteristics of bogus claims.

tation; instead of being opposed to it, he is ready to suggest or even insist upon the procedure. Another significant fact is the recent issuance of the policy, and the fact that the right-handed man loses the left hand or foot and the left-handed man the right hand or foot in a majority of cases. Many thousand dollars have been saved accident-insurance companies by the prompt despatch of a medical representative to the scene of the accident. In many cases impending amputation has been postponed, the injured member has been saved, and the company has avoided a major portion of the fraudulent claim.

ACCIDENT INSURANCE.

Written by DR. J. B. LEWIS, Medical Director and Adjuster of the Travelers' Insurance Company.

Historical.—That form of underwriting which is now generally known as accident insurance is of comparatively recent origin. It is evident, however, that there was an early conception of the idea, for we find in the ancient sea laws, under date 1514, there existed a custom of insuring masters of ships "against the perils of the seas," the success of the commercial enterprises of that period being largely dependent upon the personal safety of the captains in command. Subsequently, there were other and more definite notions of that, which, later on, evolved accident insurance. We perceive this in the proclamations issued by warring nations, awarding a stated recompense to soldiers who should be mutilated in battle, the compensation being fixed by a published schedule which was to govern the amount of indemnity. In the municipal mining laws of the old town of Goslar, Prussia, may be found distinct stipulations, some of them dating back to 1524, requiring payment of indemnity to miners in the Harz region who should suffer accidental injury. One of these reads as follows: "He who breaks any member of the body so as seriously to interfere with his capacity to work, shall receive from the common fund an amount equal to eight weeks' wages, besides free care of the physician." Other and clearer indications appear from time to time, yet it was not until about fifty years ago that the system of accident insurance as now in use was formed. The first practical attempt was by an English company, in London, in 1848. Its operations were restricted to insurance against injuries sustained while traveling by railway, and undoubtedly the introduction of steam railway travel suggested the gen-

Idemnity for wounds received in battle.

First company in England, 1848.

eral features of our present-day accident insurance. Fifteen years later—in 1863—the first accident-insurance company in this country was chartered, and it at once entered upon a successful career which has continued uninterruptedly to the present time. To write the history of that company would be, substantially, to write the history of the growth of accident insurance, the modifications it has undergone, the obstacles it has encountered, and the firm basis upon which its various forms of insurance now rest.

DISCUSSION OF TERMS AND EXPRESSIONS IN COMMON USE.

Misuse of terms.

Common usage has restricted the term *accident* insurance to an indemnity for loss by injury, notwithstanding the fact that every other branch of underwriting also intends to cover only such losses as may unexpectedly or accidentally happen. This is notably evident in fire, marine, and all other property insurance. Even in life insurance, when a policy-holder dies of "natural causes," it will almost invariably be found that the fatal disease was accidentally contracted, or brought on by circumstances which give it the character of accident. Just why one particular form of underwriting is designated accident insurance *par excellence* is not easily explained, but possibly it has grown out of the fact that the word "accident" and the word "injury" are frequently spoken, and sometimes written, as though they were synonyms. This fact is of common observation by those who are accustomed to handle correspondence giving notice of accidental injuries, or making informal claim for indemnity based thereon. In verification of this the writer has just taken, at random, one hundred such notices and claims, which have been received from as many localities, and finds that the words designated are used therein synonymously, and sometimes interchangeably, in sixty-one instances. This usage is unfortunate, because it introduces an element of confusion in the consideration of claims arising under accident policies, and medical men should be careful, when writing a surgical history of such cases, to see that they do not help perpetuate the erroneous habit or custom indicated.

Accident *vs.* injury.

THE INSURANCE CONTRACT.

Bodily Injury.—The insurance contract is usually explicit, and distinctly states that it is a stipulation against "loss resulting from bodily injuries effected through external, violent, and accidental means." It is the bodily injury, therefore, and the means through which it was effected or produced that call for our first consideration. Simple as this may appear to the novice, it nevertheless has given occasion for the most profound research, study, and critical judgment of the ablest jurists in the land. Take the word "*injury*" and note the unlike significations which long-continued usage has attached to it. Webster defines an injury to be "that which injures or brings harm," and all recent lexicographers give substantially the same definition. A meaning is thereby given to the term injury similar to that which we commonly apply to the word tort—that is to say, an injury becomes a harmful or wrongful *act*. Such a definition of the word is wholly at variance with its use in either its medical or its medicolegal sense. The surgeon's meaning has reference only to the harm which has been done; and likewise in its medicolegal use it means the *effect* produced, and not the *cause* whereby it was accomplished. With these preliminary remarks we venture to define the term "injury" as *a local alteration from its normal condition of any part of the body as an immediate effect of violence or force.* This, too, we understand to be the underwriter's meaning of the word, in its unqualified sense, when standing alone. An injury, therefore, may be external, visible, and its character clearly manifest, as in outward wounds of various kinds; or the lesion may be internal, obscure, and of an occult nature, as in shock of the nervous system.

Underwriters' definition.

The Means Through which an Injury is Effected.—These must be threefold in their nature—external, violent, *and* accidental. Of the first two it may be said that the term external violence is self-explanatory, and sufficiently comprehensive to indicate to an examining surgeon what is required in surgical questions arising under this feature of an insurance contract. In an inquiry into an alleged injury the surgeon should fully note all evidences which lead him to conclude that certain appearances were produced by outward or external means, and that

Threefold.

Scope of surgeon's inquiry.

they have resulted from force or violence applied to the person. The degree of violence is not material. On the other hand, he should also take the same precaution to observe the indications which may have brought him to an opposite conclusion. This course is essential in a case where the insurance policy requires that there shall be a visible sign or mark of the alleged violence upon the person or body of the insured. Direct violent contact with blunt objects, as by blows or falls, produces a bruise of greater or less severity. There may result no apparent alteration of the parts sustaining the blow other than a slight discoloration due to the effusion of blood-stained fluids just beneath the unbroken skin,—in popular language, "a black-and-blue," —or there may be a crushing of the parts involved to mere pulp. Between these two extremes there is every manner of contusion, according to the degree of violence encountered. To unmistakably distinguish such traumatic contusions and resulting ecchymoses from postmortem bruises and cadaveric lividity will sometimes require the most critical inspection, and is at times impossible.

Postmortem bruises.

Visible Signs of Injury.—In actions at law to recover under accident-insurance policies, where there has been conflicting evidence upon facts relating to external and visible signs of violence, the question usually has been submitted to a jury under instructions by the court. A few instances of such instructions may be cited, as follows:

"It becomes material, in the first place, to inquire whether the injury received in this case was such that it left visible external marks. Visible signs of an injury would not be confined to scratches, or bruises, or broken limbs; there might be other indications—as, for instance, if the nosebleed he had at times was the direct result of an injury, then that would be a visible sign. So if, even after two or three weeks, the bloody discharges from the bowels were the direct result of the injury, that would be a visible sign." *

What constitute visible signs.

"An injury that is internal may afford external indications or evidences, which are visible signs of the injury within the meaning of such term as is used in an accident policy. If the injury

External indications of internal injury.

* Whitehouse *vs.* Ins. Co., U. S. C. C., New Hamp., 7 Ins. L. Jour. 23.

produces, for example, a pale face and sickly look, if it causes retching or bloody or unnatural discharges from the bowels; if, in short, it sends forth, to the observation of the eye, in the struggle of nature any signs of the injury, then those are external and visible signs provided they are the direct results of the injury."*

In an appealed case it was held that it was not error to refuse to instruct that if there were no visible and external signs of injury but froth on the mouth and red spots on the body these did not constitute such signs. Whether they were external signs of injury † was a question of fact for the jury.

External signs invisible to the eye.

In the case of Gale *vs.* Insurance Company the Supreme Court of New York (in an opinion filed January 18, 1893) held that when the diaphragm and recti muscles had been injured through a strain, it was sufficient to constitute an injury of which there were external and visible signs, if it could be ascertained by laying the hand on the body, though not visible to the eye.

Amended policies.

Probably because of rulings such as the preceding one the clause relating to visible signs of violence has been amended in some recent accident-insurance policies so as to require a visible mark of violence *impinging* on the body. No legal interpretation of this phrase has yet been made.‡

Accident.—Of the causative agencies through which bodily injuries may be effected, it remains for us to consider the third one mentioned in the insurance policy, and which is therein designated "accidental means." This term, as used in the policy,

* Barry *vs.* Ins. Co., U. S. C. C., Wis., 14 Ins. L. Jour. 603.

† Newman *vs.* Ins. Co., S. C., Va., 17 Ins. L. Jour. 97.

‡ The following citations may be consulted for further information upon the manner in which the clause relating to visible sign or mark of injury has been construed by the courts:

Clidero *vs.* Scottish L. A. Co., 29 Scott. L. R. 303; Newman *vs.* Ins. Co., 84 Va. 52; Gale *vs.* Accident Assn., 66 Hun. 600; McCarthy *vs.* Trav. Ins. Co., 8 Biss. 362; Barry *vs.* Accident Assn., 23 Fed. Rep. 712, 131 U. S. 100; Pennington *vs.* Pacific Mutual, 52 N. W. Rep. 432; Whitehouse *vs.* Trav. Ins. Co., 17 Fed. cases, 7 I. L. J. 23; Eggenburger *vs.* Accident Assn., 41 Fed. Rep. 172; McGlinchey *vs.* F. and C. Ins. Co., 80 Maine 251; Paul *vs.* Trav. Ins. Co., 112 N. Y. R. 472 and note; Bernays *vs.* Accident Assn., 41 Fed. R. 455; Mallory *vs.* Trav. Ins. Co., 47 N. Y. R. 52; Owens *vs.* Trav. Ins. Co., 12 I. L. J. 75; Meneilly *vs.* Ins. Co., 148 N. Y. 596; Cronkite *vs.* Trav. Ins. Co., 75 Wis. 116; Tennant *vs.* Trav. Ins. Co., 31 Fed. Rep. 322.

General definition.

is the equivalent of, or has the same signification as, the word accident. What is accident? It is defined by lexicographers as being an event that takes place without one's foresight or expectation; an event which proceeds from an unknown cause, or is an unusual effect of a known cause, and therefore not expected; chance; casualty; contingency.—*Webster.* Anything that happens; an occurrence; event. Especially anything occurring unexpectedly, or without known or assignable cause.—"*Standard Dictionary.*" In general, anything that happens or begins to be without design, or as an unforeseen effect; that which falls out by chance; a fortuitous event or circumstance.—"*Century Dictionary.*"

Legal definition.

In legal use an accident is an event which, under the circumstances, is unusual and unexpected by the person to whom it happens.—*Bouvier.* An event happening without the concurrence of the will of the person by whose agency it was caused. It differs from *mistake* in that the latter always supposes the operation of the will of the agent in producing the event, although that will is caused by erroneous impressions on the mind.—*Livingston.*

Accident *vs.* natural causes.

In construing a policy insuring a person "against death or injury by accident" the court said: "It is difficult to define 'accident' so as to draw, with perfect accuracy, a line between death from accident and death from natural causes. But, in the term thus used, some violence, casualty, or *vis major* is necessarily involved."* The difficulty experienced in the case just cited lies in the incorrect use of the word "accident" in the policy which the court was struggling to interpret—to which erroneous usage we invited attention earlier in this chapter.

As defined by the courts of this country, an accident is the happening of an event without the aid and the design of the person, and which is unforeseen.† An unusual and unexpected result attending the performance of a usual and necessary act, and an event which takes place without foresight or expectation, is an accident within the meaning of the policy.‡ The term "accidental" as used in an insurance policy is to be taken in its

* Sinclair *vs.* Maritime Pass. Assur. Co., 107 E. C. L. 484.

† Paul *vs.* Ins. Co., 112 N. Y. 472. ‡ Martin *vs.* Ins. Co., 32 Md. 103.

ordinary, popular sense as meaning happening by chance, unexpectedly taking place, not according to the usual course of things, or not expected.* An event which takes place without forewarning or expectation; a chance, casualty, contingency. It is that which takes place without any intelligent or apparent cause, without design, and not according to the usual order of things.†

An accident within the meaning of an insurance policy is not less an accident because of the negligence of the person injured.‡ An accident may happen from an unknown cause, but it is not essential that the cause should be unknown. It may be an unusual result from a known cause, and therefore unexpected to the party.§

Intentional Injuries.—The natural sequence of our inquiry is to consider, next, certain injuries that have been regarded by the insurer as not effected through accidental means. At first the underwriter relied upon the ordinary meaning of the word accident, and assumed that injuries intentionally produced would not be covered by the policy. Experience soon taught that such reliance was not safe, and in order that the contract should be free from ambiguity upon the point indicated, the policy has since been written with a condition, substantially as follows: *This insurance shall not extend to injuries intentionally inflicted upon the insured by himself or by any other person, nor to injuries self-inflicted or received by him while insane.* The following case will illustrate the necessity for such a provision: Upon a policy *not* containing such clause or condition, but which provided that the insurance was not against "death which may have been caused wholly or in part by disease or by suicide," an action at law was brought. It was an admitted fact that the insured, while temporarily insane, hanged himself with a pair of suspenders attached to a doorknob in his bedroom. The court ruled that this case did not come within the condition against suicide, because self-killing by one who is insane is not suicide. The question presented was whether self-destruction by an involuntary, irrational act is a death effected by external, violent, and

Specific clause.

* Dozier *vs.* Ins. Co., 46 Fed. Rep. 446.
† Mallory *vs.* Ins. Co., 47 N. Y. 52.
‡ Freeman *vs.* Ins. Co., 144 Mass. 573.
§ Schneider *vs.* Ins. Co., 24 Wis. 28.

A curious ruling.

accidental means. The court said: "No one doubts that hanging is a violent means of death. As it affects the body from without it is external, and, according to decisions as to suicide under life insurance, it can not, when done by an insane person, be held to be other than accidental." *

It will be of interest to review the action taken by the courts upon cases arising under policies which contain the condition above cited or one similar thereto. A few illustrative rulings will answer our purpose.

Illustrative Rulings.—In De Graw *vs.* Ins. Co., 51 Hun. N. Y. 142, it is held that the contract of defendant was not a contract of general indemnity, but of limited indemnity only. It was not intended as an insurance of the plaintiff against death or injury, however it might occur, but to insure him against a specified class of accidental injuries only, from which an injury intentionally inflicted by the insured or by any other person was expressly excluded. Clause in policy sustained.

Limited indemnity sustained.

Stipulation Against Injuries Intentionally Inflicted by a Person or Persons Other than the Insured.—While injuries intentionally inflicted by an assault constitute an accident, so far as the person injured is concerned, if he did not expect or voluntarily bring on the assault, such injuries give no right of action on a policy stipulating against intentional injuries inflicted by the insured or any other person.† When a policy does not cover death resulting from "intentional injuries inflicted by the insured or any other person," there can be no recovery if the killing of the insured was intentional as to his assassin, though it was accidental as to insured, in that it was unexpected. To make a *prima facie* case defeating a recovery on a policy containing such a condition it is necessary only that the evidence of intentional killing preponderates against the presumption of accident.‡

Assaults.

Assassination.

A stipulation against liability for "intentional injuries inflicted by the insured or any other person" will defeat any liability for death caused by the intentional act of another person, and the intention of the insured is immaterial.§ If policy does not pro-

* Crandall *vs.* Ins. Co., 120 U. S. S. C. 527.
† Phelan *vs.* Ins. Co., 38 Mo. App. 640.
‡ Butero *vs.* Ins. Co., 71 N. W. R. 811.
§ McCarthy *vs.* Ins. Co., 15 Colo., 351.

vide against intentional injuries, an injury not anticipated nor naturally to be expected by the insured, though intentionally inflicted by another, is an accident.*

The intentional injury clause of an accident policy is rendered inoperative if the assailant who inflicts the injury is insane or incapable of discerning between right and wrong at the time the act is committed. It is sometimes alleged that an assailant is driven by an insane impulse which he is incapable of resisting, although he was indisputably of sound mind immediately prior to and soon after the deed. Instances have occurred where a man has been accused, tried, and convicted of deliberate, wilful murder by a jury of his peers; and immediately afterward another infallible jury, in a civil action brought to recover on an accident policy that had been written on the murdered man, has found that the same man who did the killing was governed by an uncontrollable homicidal impulse, being thereby rendered mentally oblivious to the consequences of his act, and at the worst had only been an unconscious, humble instrument which had innocently caused an unintentional, accidental death. Procured medical expert testimony is usually an important factor in obtaining such perversions of justice.†

Insane impulse.

Paradoxical verdicts.

Judicial Rulings upon Intentional Injury Clause Epitomized.—The action of the courts upon the intentional injury clause of accident policies may be epitomized as follows: (*1*) *Where a policy does not cover death resulting from "Intentional injuries inflicted by the insured or any other person," there can be no recovery if the killing of insured was intentional as to his assassin, though it was accidental as to insured, in that it was unexpected.* (*2*) *To make a* prima facie *case defeating a recovery on a policy containing such condition, it is necessary only that the evidence of intentional killing preponderates against the presumption of accident.* In the case of Butero *vs.* Travelers' Ins. Co. (Wis. 71 N. W. R. 811) insured was shot by a person unknown, late on a dark and stormy night, while working as usual in the coal-sheds of a railroad company, with but one fellow-workman. Two lights burned near him, and the shots were fired from behind and

* Bennett *vs.* Ins. Co., 90 Tenn., 256.

† *Vide* (Fiske) Marceau *vs.* Ins. Co., S. C. Cal., 1893.

from a place so near that the powder burned his clothing, and each one of the shots—there having been three—took effect in a vital portion of his body, while his companion ran away unharmed. Held: Sufficient to show that insured was murdered, and that the murderer knew his victim when he fired with intent to kill insured; and hence there could be no recovery where the policy excepted death from intentional injuries inflicted by any other person.*

Injuries by Burglars or Robbers.—The intentional injury clause of accident policies usually contains an exception to the effect that said clause shall not extend to injuries inflicted by highwaymen, burglars, or robbers. This is regarded as not being inconsistent with the general features of accident insurance, because of the fact that doing bodily harm is not the object of a burglar or robber. If he can effect his purpose without personal violence,

* The following cases, which were brought upon policies containing an exception from liability for intentional injuries inflicted by the insured or any other person, all sustain the doctrine of the foregoing case: Phelan *vs.* Travelers' Ins. Co., 38 Mo. App. 640; Johnson *vs.* Travelers' Ins. Co., 39 S. W. R. 972; Morris *vs.* Travelers' Ins. Co., 43 S. W. R. 898; Hutchcraft *vs.* Travelers' Ins. Co., 87 Kentucky 305, 85 S. W. R. 570; Fischer *vs.* Travelers' Ins. Co., 77 Cal. 246, 19 Pac. R. 425; McCarthy *vs.* Travelers' Ins. Co., 15 Col. 351 (25 Pac. R. 713); DeGraw *vs.* National Acc., Sec. 51 Hun. N. Y., 142; Travelers' Ins. Co., *vs.* McConkey, 127 U. S. 600; Rwy. Off. and E. Ass'n *vs.* McCabe, 61 Ill. App. 565; Langholz *vs.* W. Com. T. A., U. S. C. C. A. 1898 (Tex.); Am. Acc. Co. *vs.* Carson, 24 I. L. J. 738; Henderson *vs.* Travelers' Ins. Co., 69 Fed. R. 762, 16 C. C. A. 390, reversing 65 Fed. R. 438; Ging *vs.* Travelers' Ins. Co. (Minn.) 28 I. L. J. 279; Orr *vs.* Travelers' Ins. Co. (Ala.) 24 So. R. 997; Brown *vs.* U. S. Casualty Co., 88 Fed. R. 38; Rwy. Off. *vs.* Drummond, 76 N. W. R. 562.

In some of the following cases the policy did not contain the intentional injury clause, in others the decisions were based on other exceptions, and in one the question was one of proof: Richards *vs.* Travelers' Ins. Co., 39 Cal. 170, 26 Pac. R. 762; Guldenkinch *vs.* U. S. M. A. A., 5 N. Y. Sup. 428; Accident Co. *vs.* Bennett, 90 Tenn. 256, 166 W. R. 723; Langdon *vs.* U. S. M. A. A., U. S. Circuit Court, S. D. N. Y. Jan. '95; Union Casualty and Surety Co. *vs.* Harroll (Tenn.) 27 I. L. J. 176; Sup. Lodge O. C. F. *vs.* Garrigues, 104 Ind. 133; Gresham *vs.* Equitable L. and A. Co., 87 Geo. 497; Jones *vs.* U. S. M. A. A., 61 N. W. R. (Iowa Sup. Court) 485; Ripley *vs.* Rwy. Pass. I. Co., 11 Fed. cases, 854 (2 B. L. and A. 738); Warner *vs.* U. S. M. A. A., 32 Pac. R. 696, 22 I. L. J. 704; Lovelace *vs.* T. P. A. of Am., 28 S. W. 877; Robinson *vs.* U. S. M. A. A., 68 Fed. R. 825; Collins *vs.* Fid. and Cas., 63 Mo. App. 253, 1 Mo. App. R. 773; Button *vs.* Am. Mut. Acc. Co., 92 Wis. 85, 25 I. L. J. 461 (65 N. W. R. 861).

The decision in Am. Acc. Co. *vs.* Carson, 25 I. L. J. 738, was reversed in 34 L. R. A. 301; 36 S. W. 169; the court distinguishing the policy in this case from the one in the Hutchcraft case, in which the intentional injury clause was sustained by the court.

he does so. Criminal assault is resorted to by him only when he finds, in his opinion, it is essential or convenient to make use of it in order that he may successfully accomplish his ends. In some instances also he may inflict wounds in his own defense in an endeavor to escape capture. All such injuries, although intentionally inflicted by a robber, are clearly within the policy, by reason of the exception noted. Are within the policy.

Self-inflicted Injuries and Mutilations.—This exception to the intentional injury clause opens the door very invitingly to those who would perpetrate frauds upon insurance companies through self-inflicted injuries. Such injuries may be suicidal, and so cunningly planned as to give the appearance of robbery and murder, as in the celebrated Colvocoresses case; or disabling only, through minor injuries caused by the sufferer himself, for the purpose of obtaining indemnity under his accident-insurance policy. Within the experience of the writer many cases of this character have been investigated and their peculiarities studied.

General Characteristics of Self-inflicted Wounds.—While it is not the intent of this paper to enter into a medicolegal discussion of any of the numerous questions arising under accident-insurance policies, yet it may be a pardonable digression at this stage to indicate certain characteristics which the less serious, self-inflicted wounds sometimes present. It has frequently been observed that such wounds are comparatively superficial or trivial, but when there are two or more in the same locality, it also may be seen that a *parallelism* often exists, which is especially noticeable. Particular attention is invited to this distinctive or diagnostic feature.

Dr. Norman Cheever, in his treatise published in Calcutta, 1870, on page 357, in describing cuts upon a man's thigh, says: "Their being exactly *parallel* was also strongly against the man's story; and from their direction, parallelism, and uniform want of depth they were just the sort of wounds that a faint-hearted man would inflict upon himself—first timidly drawing the sword over his thigh, and inflicting a mere scratch; and then, knowing that the safety of his neck depended upon his having some wound to show, half plucking up his courage and giving a wound, it is true, but a very slight one."*

*The direction is of great importance. Nearly all right-handed men will draw the knife from left to right.

Illustrative Cases.—Among the earlier cases of this kind that have come under the writer's inspection is one that occurred about thirty years ago. A condensed history and an extract from evidence bearing upon the point under consideration are all that need be given. On an October night, at about nine o'clock, a large, strong, able-bodied man was seen moving slowly, with a staggering, hesitating step, on an unfrequented street. Assistance was offered him and a physician summoned. Upon examination, incised wounds were found on his neck, in front, and two trivial parallel cuts upon the left arm and two upon the left forearm. He had on kid gloves which showed cuts upon their palmar surface, and on removing the gloves slight scratches were found upon his hands, indicating that the instrument which had made the slashes in the gloves had cut through in some places. His clothing was greatly disordered; only half of his shirt collar remained, his vest was torn down from the arm—one side all the way and the other part way, and an inside vest-pocket had been pulled entirely out. He was taken to his home, which was near by. It was then found that he had five small punctured abdominal wounds. Of these, four were in the umbilical region, all near together, and the fifth was just above the pubis. The neck wounds were transverse, incised, in front, superficial, or through skin and cellular tissue only, about four inches in length, close together, and parallel. One or more of the abdominal wounds penetrated to the peritoneum, wounding it. Inflammation ensued, and unexpectedly proved fatal on the third day following the wounding.

The injured man said that he had been assaulted by three men, one of whom caught him around the neck and the other two sprang upon and cut him. He further said his assailants had robbed him of $1500 which he had upon his person. This money, he said, had been paid him in New York that day by a friend, who had immediately afterward sailed for Europe, and who, by the way, has never since been heard of or from. An ordinary dirk was found near where the alleged assault took place. A very thorough investigation was made by the police department and by others, and said department came to the conclusion that the story was a "fake"—that no assault or robbery had been committed; that the wounds were self-inflicted for the

purpose of obtaining weekly indemnity on his accident insurance, and that a fatal termination had been wholly unexpected by him. As he was placed fully and continuously under the effect of opium early in the treatment of the case, no later details of the alleged robbery were obtainable.

Suit was brought to recover the principal sum named in the insurance policy, and an exhaustive trial followed. The medical evidence, covering the medicolegal questions involved, was voluminous and instructive. From that of Professor Bacon we will quote his remarks touching the visible appearance of the wounds. In describing the wounds the Doctor said: "There were four groups, one of these consisting of the neck wounds. These were on the front of the neck—three very sharp cuts. *They were almost precisely parallel to each other, and close together.* The distance between the uppermost and the lowest of the three cuts was less than one inch. They were all at the top of the neck, just below the chin, near the top of the windpipe. They all of them seemed to begin at the left side of the neck, and to be completed as they would be in the act of drawing the instrument toward the right. Beginning a little below the angle of the jaw on the left side, coming down obliquely and crossing the windpipe, but not going up much on the right side of the windpipe. The shallow and trivial character of these wounds was remarkable. The second group of injuries was in the left arm and forearm. They were very small, and so unimportant that no attention had been given them. They had not required dressing. There were two above the elbow and two below; all four of them on the inner side of arm and forearm. They were made by thrusting from the right side. It required very close examination of the hands to find evidence of any scratch or cut in the third group. There were two scratches not deep enough to divide the skin. The fourth group of wounds was in the belly. These were unlike the wounds in the throat. They were stabs. Their direction was from above downward and obliquely from right to left. They were made apparently without any lateral movement of the instrument inflicting them. They were narrow. Two of them, which seemed to be the most important, were nearly in the middle line. The other three were smaller. All the wounds in the abdomen had the same general direction—

downward and toward the left. It was a very striking characteristic that I have described, that they appeared to radiate from one center of motion. Careful search was made over the surface of the body for other appearances of wounds, but no such indications of violence could be found. The wounds in the throat were strikingly typical of the sort of wounds which we frequently see in that position, and which we recognize as self-inflicted. In the first place, regarding the part of the throat on which they were inflicted : beginning on the left side and drawn toward the right, and being at the top of the neck ; and in the second place, being cuts and not stabs. Their being *parallel* strongly suggests that they came from the same center of motion and that they were produced by the same hand. Assassination wounds upon the neck—wounds inflicted upon the neck by somebody else—are commonly about the base of the neck, and usually directed downward instead of upward. In estimating the value of the wounds to found an opinion upon, I was obliged to consider the negative appearances of the body, the fact of the absence of scratches and bruises, and also the very moderate amount of violence used in producing these wounds. Coinciding with this was the fact that there were no marks upon the person of the deceased indicating resistance to violence. This was still more striking when I examined the condition of the clothing worn at the time the wounds were inflicted. There were marks on the clothing corresponding to the wounds on the surface of the body, except those in the throat, which were not covered with clothing, and in addition there were a great many slashes, cuts, and stabs through the clothing, which left no corresponding mark upon the body—especially through the sleeves which had covered the left arm. A pair of kid gloves were extensively cut through, and yet only two very slight scratches on the palm, exceedingly shallow, not cutting through the skin, had been made."

About five years after the above-mentioned case occurred a man (who was a carpenter by trade, and who resided in Vermont) was found wounded in almost identically the same manner. The writer of this paper had occasion to investigate his case also, at the time, and found that his wounds presented the same characteristic appearances. The neck wounds, however,

were more serious, and instead of being wholly in front, were more on the left side. They were incised, *parallel wounds*, and close together—running into one another. The abdominal wounds were ten in number, consisting of seven stabs in the umbilical region, all near together, and three other trivial stabs, close together, under short ribs, left side. The neck wounds, though superficial, bled so profusely that the man's life was considered in danger, and when informed that he probably could not recover, his conscience so troubled him that he made a full confession, not only relating the manner in which he inflicted the wounds upon himself, but also admitted that his motive was to defraud the insurance company. Unexpectedly, and perhaps unfortunately, he got well. Many similar instances could be related by the writer.

A unique suit, based upon the exception in the intentional injury clause above noted, was recently brought, the contention being whether the murderer who inflicted the injury did it for the purpose of robbery. The case alluded to is that of Ging *vs.* Travelers' Ins. Co., S. C. Minnesota. This action was brought by Katherine Ging's administratrix to recover the principal sum insured on an accident policy of the defendant. There was a provision in the policy whereby the clause exempting the company from liability for intentional injuries should not exclude claims for personal injuries received by the insured while defending herself or her property from the assaults of robbers. It was admitted in the pleadings of both parties that the insured, Katherine Ging, was intentionally killed by one Blixt at the instigation of one Harry Hayward. The motive for the murder was Hayward's desire to recover on the insurance policies which had been assigned to him by the insured. Hayward was tried for the crime of having incited Blixt to commit the murder, in order that he, Hayward, might realize on the insurance policies, and was convicted, sentenced, and executed. After his conviction Hayward relinquished and released the assignments, which were worthless, and this suit was instituted to recover as aforesaid. Voluminous testimony was produced, including a circumstantial account of the murder as related by Blixt himself. The murderer and his victim were out driving in a buggy at the time. Blixt testified to instructions which had been given him by Hay-

ward with regard to Miss Ging's sealskin sack. Hayward's directions were: "After you have killed her, I want you to take her cloak off, and I want you to carry it as far as possible, and when you leave the horse, then drop it." This was for the purpose of giving to the deed the appearance of robbery. Blixt did not carry out this part of his instructions. He did not take nor attempt to take the sealskin sack.

Robbery not the motive.

After argument, the court directed a verdict for the defendant. The court disposed of the case on the conclusiveness of the evidence that at the time of the death of Miss Ging she was not in the act of defending her person or property against the attack of a robber. Blixt had testified that he inflicted death by use of a revolver; that he shot the woman in the back of her head. The court said: "The wound on her person bears out that statement: he testifies that she was looking out of the buggy; he shot her from behind. The wound itself shows that that was done, because powder-marks showed burning of the skin and burning of the hair. That to that extent corroborates Blixt's detailed statement. I do not think the case is any different from what it would be if she were in her bed and sound asleep when she was killed. The evidence is such that if the case were submitted to the jury, and the jury were to return a verdict for the plaintiff, it would not be permitted to stand." Plaintiff appealed to the Supreme Court, and on review of the case, the order of the court below was affirmed.

The questions arising under the clause in an accident policy touching injuries inflicted by a burglar or robber usually call for a more extended medicolegal inquiry into the aspect and nature of such wounds than seems to have been necessary in the Ging case, judging from the brief summary of the appearances of the wound as disclosed in the remarks of the court in his order dismissing the suit.

Intoxication.—Accidental injuries resulting from intoxication are of frequent occurrence. The police surgeon is familiar with such injuries. All medical men are liable to be summoned in emergency accident cases, and at such times it may become important to determine whether the patient has unmistakable evidences of intoxication or not. The condition of a person deeply under the influence of liquor so closely simulates that of

cerebral compression and of concussion that it is sometimes difficult to recognize the difference between the two states. Especially is this difficulty increased when, as often happens, a drunken man has sustained a blow upon his head by an accidental fall or by means of some weapon. Under such circumstances the drunken stupor or incoherence of speech is liable to be confounded with or mistaken for cerebral injury. On the other hand, even when there is no perceptible alcoholic odor in the breath, and no history of the case to indicate intoxication, serious mistakes in diagnosis have been made by medical men. It is not singular, then, that a police officer, on finding a man who has been rendered insensible by compression, should send him to the station-house for the night as "found drunk."

Difficulties in differentiation.

If the injured man who is found under such conditions is insured under an accident policy, it is well to know that such policy is written subject to the provision that it does not cover accident nor injury resulting from intoxication or while intoxicated. This will properly lead us to inquire what is meant by the term "intoxication," as used in the policy. We necessarily look to the decisions of the courts to determine all such questions. In Scotland an action on an accident policy was brought against the Railway Passengers' Assurance Company by the administratrix of a man who had died of accidental injuries. On the trial, the jury found for the plaintiff, and an appeal was taken to the Common Pleas Division, before Lord Coleridge and Mr. Justice Denman. The policy provided that it should not extend "to any death or injury happening while the assured is under the influence of intoxicating liquor." The deceased had, on the night when he met with the accident from which he afterward died, been drinking to a certain extent, but there was a conflict of testimony as to his condition, and as to the effect which such liquor as he had taken had produced upon him. One question to be decided was: What meaning was to be put upon the words "under the influence of intoxicating liquor"? On this point Lord Coleridge said: "It seems to me that these words would be satisfied when the influence of intoxicating liquor is found, in point of fact, to be *such as to disturb the quiet and equable exercise of the intellectual faculties of the man who had taken the liquor.*" Lord Denman agreed substantially with this,

Defined by Lord Coleridge.

but said that he was not at all sure that the meaning of the words might not be somewhat more restricted.

In New York an action at law was brought on an accident-insurance policy containing this condition: "No claim shall be made under this policy when the death or injury may have happened while the insured was, or in consequence of his having been, under the influence of intoxicating drinks." Appeal was taken by defendant from a judgment in favor of plaintiff. The facts are sufficiently recited in the opinion of the court. The insured was spending a day at the house of his friend, one Henry Ward, and in the course of the day they drank both champagne and whisky, but it does not appear that either was so far under the influence of liquor as to indicate it in his conduct prior to sitting down to dinner about 5 P.M. At dinner both drank champagne and whisky, and several witnesses testified that the insured showed by his speech and manner that he was under the influence of liquor. Others who saw him, either shortly before or at the beginning of the dinner, thought him not under the influence of liquor. While at dinner Ward and the insured were talking about shooting, and the latter told Ward he could not shoot a frog, and Ward told him he could shoot his (insured's) ear, and the latter said he might shoot at it for ten cents, and soon thereafter a shot was heard, and witnesses going into the dining-room found the insured on his knees on the floor, groaning and in great pain. The pistol-ball entered the abdomen, passed through the liver, and lodged near the spine. The wound caused death in a few days.

Illustrative case.

In the trial the court instructed the jury that the plaintiff could not recover if the evidence satisfied them that the shooting and wounding of the insured happened in consequence of his having been under the influence of liquor at the time. He further charged: "The question is: Was the injury the natural or reasonable result of his being in that condition?"

The appellate court held: "To be under the influence of intoxicating liquors, within the meaning of this policy, the insured must have drunk enough to disturb the action of the physical or mental faculties, so that they are no longer in their natural or normal condition. When, therefore, the defendant imposed upon persons insured by it the condition that it would not be liable

Ruling of appelate court.

when death or injury should happen while the insured was under the influence of liquor, the intention manifestly was to require the insured to limit its use in such a degree as that he retained full control over his faculties of mind and body. While he did so the company was reasonably secure against the insured exposing himself unnecessarily to danger from his own act or the acts of others, produced by his own irritating or offensive conduct or language.

"It is the condition in which a person places himself by the use of liquor that the company intended to guard itself against, as well as against death or injury resulting from its use.

"To require the company to prove, before it can relieve itself from liability, not only that the insured was under the influence of liquor when the death occurred, but that drinking it caused the death, either by direct action on the vital organs or by exciting the passions of the person insured so as to cause him to insult or injure others to such a degree as to induce them to take his life, is imposing an additional burden on the company not embraced in the terms of the policy.

"The cases that hold that the insurer must show that the relation of cause and effect exists between the thing prohibited and the death or injury have no application to the cause under consideration, as it avoids liability if the insured was in a certain prohibited condition, without regard to whether it had any agency in producing death or injury. By putting himself under the influence of liquor he deprived the company of the security it would otherwise have had that he would do nothing to expose his life or health unnecessarily to injury.

"Cause and effect."

"The circumstances attending the shooting justify the inference that the drunken bravado of the insured, if it did not directly induce Ward to shoot him, had a tendency to excite and irritate him, and thus provoke him to shoot.

"The succeeding clause in the condition, which is in the following words, 'Or in consequence of his having been under the influence of intoxicating drinks,' presents the distinction which I desire to draw between the first clause of the condition and those in which it must be shown by the company that the death or injury was the consequence of violating, or not complying with, the condition.

Various rulings.

"To render the company liable under the clause last mentioned, the death or injury must not be in consequence of the previous use of liquor. The relation of cause and effect must exist between the use of the liquor and the death or injury." *

An action was prosecuted on a policy in which was incorporated the following stipulation: "This insurance does not cover . . . death or disablement happening to the insured while intoxicated, or in consequence of his having been under the influence of any narcotic or any intoxicating drink whatever."

On appeal the court held: "The phrase, 'under the influence of intoxicating drinks,' as used in policies of this character and in this connection, has a legal significance, differing from the popular one, and implying such influence as in reality amounts to intoxication." Citing the preceding case, Shader *vs.* Assurance Company, the court held that intoxication released from liability, whether it contributed to the injury or not.†

In an action upon an accident-insurance policy in which one of the defenses was that the insured came to his death while under the influence of intoxicating drinks, which, if true, was by the terms of the policy a bar to a recovery, the fact that the uncontradicted testimony for defendant showed that insured was drunk when last seen alive, under circumstances which created a strong probability that in a short time thereafter and while in the same condition he accidentally fell into the river in which his dead body was afterward found, did not authorize the court to give a peremptory instruction for defendant, as the testimony showed only a probability, though a strong one, that the insured was drunk at the time of the accident.‡

Disease.—An accident policy expressly declares that it covers neither disability nor death resulting directly or indirectly from disease. Nor does its insurance extend to either an accident or an injury resulting from disease. There are frequent cases aris-

* Shader *vs.* Ins. Co., N. Y. S. C., 5 Bigelow, 331.

† Standard Ins. Co. *vs.* Jones, 94 Ala. 434.

‡ Couadeau *vs.* Ins. Co., 95 Ky. 280; Mut. Life Ins. Co. *vs.* Stibbe, 46 Md. 302; Travelers' Ins. Co. *vs.* Harvey, 844 Va. 949; Prader *vs.* Ins. Co., 63 N. W. Rep. 601; Mair *vs.* Ins. Co., 37 L. T. N. S. 356; Pyne *vs.* Ins. Co., 2 Daup. Co. Rep. 110; Flint *vs.* Travelers' Ins. Co. (Tex. Civ. App.), 43 S. W. 1097; De Van *vs.* Ins. Co., 51 N. E. 1090, 157 N. Y. 690.

ing under this condition of the insurance contract that call for careful investigation by the examining surgeon. In a certain litigated case of this character, the contention being whether the insured died of typhoid fever or of accidental injuries, the facts disclosed in evidence were very fully considered by the court in his instructions to the jury. It appears that the insured was accidentally thrown from a wagon, got up from the ground and remarked that he was not hurt, but afterward complained of pain in the head and back and soreness in his side. A physician was summoned. There were "feverish symptoms and some headache." The sickness continued about four weeks, when the patient died. An autopsy disclosed the distinctive ulcerations peculiar to typhoid fever. The court charged the jury, in part, as follows: "Now, here comes in your duty to judge between the accident, complaints of pain in head and shoulder, general feverish symptoms, and of this condition of the bowels after death, and then it is for you to say what was the probable cause of death. If you find that the probable cause of death was the accident, then you will find for the plaintiff; but if you find that the accident was not the cause of death, or that the accident would not have produced death unless the fever set in, or some other disease, then you will find for the defendant. If you should find that typhoid fever supervening was wholly or in part the cause of death, you must find for the defendant; but if you are satisfied that the death resulted directly from this accident, you should find for the plaintiff. You would not be justified to find that this party died by accident or died of the fever unless you are satisfied upon the proof that there was fever; neither would you be justified in finding that he died of shock to the spine or brain unless there was proof." *

Typhoid fever or accident.

Judicial charge.

On the other hand, an accident causing peritonitis which results in death is within a policy limiting liability to cases where an injury is the proximate cause of death, *even though the insured was very liable to a recurrence of the disease by reason of former attacks.*†

Existing Disease Aggravated by Injury.—Disease is sometimes

* Whitehouse *vs.* Ins. Co., U. S. C. C., N. H., 7 Ins. L. Jour. 25.

† Freeman *vs.* Ins. Co., 156 Mass. 351.

aggravated by injury. In a foreign case where the policy provided that the insurance company would not be liable for death arising from natural diseases accelerated by accidental injuries, it was held that the company was not liable when the insured died of a disease aggravated by the accident, although he would not have died when he did had it not been for the accident.*

Disease Caused Solely by Accidental Injury.—Upon the question of liability for the result of disease when caused solely by accidental injuries, there have been numerous rulings by the courts. From one of these we quote as follows: "If the deceased sustained injury to an internal organ, and that necessarily produced inflammation, and that produced a disordered condition of the injured part whereby other organs of the body could not perform their natural and usual functions, and in consequence the injured person died, the death could properly be attributed to the original injury. In other words, if these results followed the injury as its necessary consequence, and would not have taken place had it not been for the injury, then I think the injury could be said to be the proximate and sole cause of death; but if an independent disease or disorder supervened upon the injury,—I mean a disease or derangement of parts not necessarily produced by the injury,—or if the alleged injury merely brought into activity a then existing but dormant disorder or disease, and the death of the deceased resulted wholly or in part from such disease, then it could not be said that the injury was the sole or proximate cause of death."†

Supervention of independent illness.

Renewed activity of dormant disease.

Illustrative Cases.—In a case where a policy of accident insurance provided that the company should be liable if the insured should sustain bodily injuries effected through accidental means, and the case being one where the alleged injury was claimed to have been sustained in the use of Indian clubs for physical exercise, it was held: "That if the deceased, while using the clubs (through the occurrence of an unforeseen and unexpected circumstance which interfered with and obstructed the usual course of such exercise), sustained injury by rupture of a blood-vessel in his lung, and that necessarily produced inflammation, and that

* Anderson *vs.* Scottish Acc. Ins. Co., 27 Scottish Law Rep. 20.

† Barry *vs.* Ins. Co., 14 I. L. J. 603, 23 Fed. Rep. 712. Affirmed 131 U. S. 100.

necessarily produced a disordered condition of the injured organ, which was in consequence followed by the formation of abscesses and the accumulation of injurious substances or matter in the lung or lungs, and so that there resulted a diseased state whereby they could no longer perform their functions, and in consequence the insured died—that is, if all these results followed the injury as its necessary consequence, and would not have taken place if it had not been for the injury, then I think the injury could be said to be the proximate cause of death. But if an independent disease supervened upon the injury, one not necessarily produced by the injury, or if the alleged injury merely brought into activity a then existing though slumbering disease, and the death of the deceased was caused wholly or in part by such disease, then it could not be said that the injury was the sole and proximate cause of the death. . . . If there was a diseased condition of the lungs when the injury was sustained, and it merely facilitated the progress of the disease, or if a disease such as pulmonary consumption supervened, not as the necessary consequence or product of the injury, then you can not say that the injury caused the death."*

Death from apoplexy resulting from an effusion of blood caused by a concussion or contusion of the brain produced by a fall is within the insurance of an accident policy. (Hall *vs.* Ins. Co., 86 Wis. 518; Nat. Ben. Assoc. *vs.* Grauman, 107 Ind. 288.) The difficulty, in such cases, is to determine whether the effusion is so produced or has escaped from diseased vessels independently of any violence. As an illustrative case we will mention the following: A short, thick-set man, forty-four years of age, and weighing nearly two hundred pounds, on being notified that his foundry building was on fire, hurried on foot to the place, and actively engaged in trying to save his property. It was a cold December evening, and in going about the burning building he waded in freezing water ankle deep, and passed through a very dense, suffocating smoke. Soon afterward he fell, in an insensible condition, upon the icy ground. With but little delay he was removed to a place of safety, and a medical man summoned. The physician found him apoplectic, unconscious, breathing

Apoplexy.

* McCarthy *vs.* Ins. Co., 8 I. L. J. 208.

heavily and with difficulty. Warm applications were placed about the limbs, which were very cold and wet, and an attempt was made to administer a stimulant. He vomited two or three times. On being taken home he was bled from the arm "very freely." His breathing became stertorous; he was profoundly comatose, and venesection again was resorted to, to the extent of "thirty or forty ounces altogether." He gradually sank, and died early the next morning.

At the autopsy, forty-eight hours after death, no visible marks of violence were seen upon any part of the body. With the exception of some congestion of both lungs, the thoracic and abdominal organs were in a normal condition. On examination of the brain there was found a blood-clot, of some two or three ounces, in the base.

Upon the foregoing history and incomplete autopsy an action was brought to recover the principal sum insured on a policy which was limited in its liability so as to cover only such deaths as should be occasioned solely by bodily injuries, effected through external and violent means, independently of any disease contributing to the production of the injury or lesion. In its medico-legal aspects the case suggested a solution of the following questions: (1) Was the cerebral hemorrhage caused solely by external violence or force? and if it was, in what manner is the application of such violence to be explained consistently with the admitted facts? (2) Was the hemorrhage due to a diseased state of the cerebral vessels as a predisposing cause, and to mental excitement and physical overexertion as an exciting cause? (3) Could the several factors combined—mental excitement, physical overexertion or fatigue, and chilling the extremities by wetting his feet in ice-water—have effected the hemorrhage had there been no preexisting morbid changes in the tissues? After a careful inquiry into all the important facts our conclusions were that to the first interrogatory the answer should be *no*. To the second, that while there is no positive proof of such disease, yet presumptively it existed; and with that qualification, the answer should be *yes*. To the third we answer *no*, for the reason that increased blood tension *alone* could not rupture vessels which had lost nothing of their natural cohesion, and were embedded in surrounding tissue which had undergone no change whatever

in consistence. Our advice to the defendant company was in accord with these answers.

The theory in support of plaintiff's claim, as we were informed, was substantially that the fall of the insured upon the ice was occasioned by having his feet accidentally slip from under him, so that he sustained the force of the fall or blow while in a sitting posture; and that thereby a jarring vibration was indirectly transmitted to the brain, which produced at the same time both concussion of the brain and vascular rupture. The immediate insensibility was accounted for by the shock of concussion; and the coma, followed by death, was but the natural result of the cerebral hemorrhage. This theory was unsupported by fact. The evidence of plaintiff's witness, as appeared by affidavit in support of claim, showed that "he fell on his right side to the ground." Witness "was about ten feet behind him; went to him as soon as he fell; took a portion of a cigar from his mouth; he appeared to be insensible; he breathed very heavily." This evidence is a description of insensibility due to cerebral apoplexy, rather than to concussion; while a fall such as described could not, in any reasonable probability, produce an indirect vibratory jar sufficient to cause so profound a loss of consciousness. Nor could it, in like manner, have produced rupture of cerebral blood-vessels that were perfectly free from disease. Were such grave results possible from such trivial causes, few brains would escape traumatic hemorrhage.

On the other hand, there were conditions present to favor the occurrence of cerebral hemorrhage from diseased vessels by producing an increase of arterial tension—viz., emotional excitement, with its effect upon the frequency of cardiac action; physical overexertion or fatigue, with its depressing influences; and ice-cold extremities, inducing contraction in the cutaneous arteries. His age and plethoric habit, each being an important predisposing cause, were properly taken into consideration, in connection with the other facts, as being conducive to hemorrhage. Even though the autopsy, as conducted, had failed to exhibit an abnormal condition of the cerebral vessels, still there is sufficient in the disclosures which were noted to point out its probable existence. As a matter of fact, the reported examination of the brain ceased upon finding, though not very definitely,

the locality of the hemorrhage and the proximate cause of death. The capillary vessels were not minutely examined. Neither were the kidneys examined except *in situ*. Taking the case as a whole, therefore, in our opinion there was a strong probability that the cerebral blood-vessels were diseased, and that, as above stated, the answer to interrogatory No. 2 should be given affirmatively. The case was prepared for trial, but an amicable compromise adjustment caused the suit to be discontinued.

Epilepsy.

Cases of apoplexy figure largely in contested accident claims. To a less extent there are cases of injury complicated with epilepsy. It has been held that drowning in a brook while in an epileptic fit is within a policy covering death by "accidental, external, and visible means," although excluding death from natural disease."* On the other hand, a person found dead in a plunge bath in which the water was four and a half to five feet deep, and about eight to ten feet square, and at a temperature of more than 100° F., was held to have died from other causes than accidental injury, the evidence showing that such a bath would be likely to bring on an epileptic fit, and that the insured was subject to such fits.†

Numerous other adjudicated cases have arisen under this provision of an accident-insurance contract which excludes liability for the results of disease, and inevitably such cases must frequently occur. Wherever pathologic questions enter into a disputation there will be honest diversity of opinion among medical men, and necessarily different conclusions will be reached by them. Only with matters pertaining to an exact science could it be otherwise. But when the evidence in any given case shall be all in, and the court sees fit to summarize both the facts and the opinions thereon which have been submitted, it doubtless will be found that the general principles laid down in the rulings and instructions above cited will be substantially followed.

There are several other provisions or conditions limiting, restricting, or qualifying the insurance under accident policies which perhaps would be of interest to consider in this connection, but as these have comparatively little to do with the medical or

* L. R. 6 Q. B. Div. 42.

† Tennant *vs.* Ins. Co., 31 Fed. Rep. 322.

medicolegal features of the contract, they thereby become of less importance to those who may consult this chapter.

The Insurance Contract.—Having, in the preceding pages, examined the nature of the risk which is insured against under an accident policy, it will be proper now to look into the insurance contract itself and (in the light of its interpretation by the courts, as above noted) see how the insurance is to apply. While there is a great variety of these policies, yet they all make a division of the insurance into two characteristic parts—(1) insurance against loss of time from the business occupation of the insured; (2) against loss of life. These are the two underlying distinctive losses insured against. Usually, both are incorporated in the same policy. Sometimes one only is written, to the exclusion of the other. The first, commonly called *disability* insurance, is often subdivided into what is denominated "total" and "partial" disability. Of these, the policy designates the former as being the physical condition of the insured when wholly disabled from transacting any and every kind of business pertaining to his occupation, and the latter when wholly disabled from one or more important daily duties of occupation, although he may be able to and does give his time or his manual labor to other duties of his business. These physical disabilities entitle the insured to weekly indemnity to such an amount as is named in his policy. In some policies there is also provision made for *permanent* disability, by which term is meant that if it shall appear after a lapse of two years from date of accident the insured has been continuously and wholly disabled from all gainful pursuits, and probably will remain so disabled for life, he then becomes entitled to additional indemnity according to the terms of his policy. There are further special features that belong to the disability part of an accident policy. These consist, mainly, of provisions made for loss of limbs or of eyesight. The second part—the insurance against loss of life—provides payment of the principal sum when death results within the provisions of the contract. The age limit of this insurance is usually from eighteen to seventy years.

Life and disability.

"Total" and "partial" disability.

Permanent disability.

Liability Insurance.—This is a branch of accident insurance which has been in operation but a few years. Prior to 1880 the common law of England governed the legal responsibility of

employers in that country for personal injuries suffered by employees through any form of negligence which resulted in such injuries. In that year, 1880, the English Employers' Liability Act extended the liability of the employer somewhat, while the Workmen's Compensation Act of Parliament, passed in 1897, seemed to throw upon employers still further obligations. These acts, especially the latter, have given rise to much litigation in England, and this naturally led to the formation of insurance companies that would indemnify employers against such losses. Liability insurance attributes its origin to the paternity indicated. It was soon found to be as great a necessity in the conduct of an employer's business as was his fire insurance.

The new insurance was quickly introduced into this country and soon found favor here. Its growth has been remarkably rapid, and during the year 1898 ten companies in the United States were actively engaged in this branch of underwriting.

Various forms.

This form of insurance has been extended so as to cover liability to any and every person, based upon injuries sustained through direct or indirect negligence of those who should be held legally responsible. This has resulted in writing what is known as "public liability insurance," and a variety of policies are now used for this purpose. Thus we have the "manufacturers'," the "contractors' or builders'," the "marine employers'," the "landlords'," and other public liability policies. To these may be added the "elevator liability" policy, insuring against loss for damages on account of bodily injuries accidentally suffered while in an elevator car; the "horse and vehicle liability" policy, insuring against injuries suffered by any person through the negligence of the assured by means of horses or vehicles in his service; the "theater liability" policy, insuring against damages on account of injuries suffered while within the theater or hall mentioned in the contract; and perhaps others. Public liability policies are also written, insuring steam railway and electric railway companies against loss through common law or statutory liability for damages on account of bodily injuries suffered by passengers or others, through negligence of employees or through any other means designated in the policies.

Simulated Injuries.—It will readily be seen that this has opened up a new and an extensive field for accident underwriting,

and if the hazard insured against was only such as resulted from legitimate or honest accidents, it would be vastly better for both the insurer and the insured. Within a few years damage suits, based upon alleged accidental bodily injuries which are attributed to the negligence of the party sued, have become notoriously common, especially in the larger cities. In those cities may be found many lawyers, of the kind known as "ambulance chasers," who make it a prominent feature of their business to seek out the sufferer in every street accident, and enter into a bargain with him to prosecute his supposed claim against some alleged negligent party. In collusion with these lawyers there are doctors of medicine who hold themselves in readiness to appear as expert witnesses, in which capacity they often are—financially, at least—*particeps criminis*.

"Ambulance chasers."

Sophisticated experts.

Manufactured Cases.—In a given case, if no accident has really occurred, one is sometimes manufactured on a trivial basis, and witnesses provided whose perjured testimony is usually sufficient to mulct the defendant in a damage suit. The writer has known of written testimony being prepared for witnesses to memorize, and for two or more witnesses to rehearse until they should all know it by heart, all of which was perjury from start to finish. In each of these sham cases there is, of course, the medical man who has been summoned in an emergency. Not infrequently he is as innocent of the deception as he is unsophisticated, and has been himself imposed upon by those who have planned the conspiracy to defraud. Such a thing is easily done, even to an experienced surgeon, as we have frequently known.

Prepared witnesses.

Unsophisticated surgeons.

The favorite trick of these impostors is an alleged street-car accident. Generally, it is asserted that an innocent passenger, in attempting to either enter or leave a car, was jerked from the platform or steps by the premature starting of the vehicle, through the culpable negligence of the conductor, and thrown violently upon the ground. Then an ambulance is summoned, and a doctor's office near at hand, or an emergency hospital, welcomes the sufferer. If he appears physically able to do so, he relates a plausible story in answer to the doctor's questions, or if seemingly unable, there is always a friend at hand to do it for him. Usually some visible evidence of external violence is easily discovered.

Bogus street-car accidents.

With perjured witnesses to manufacture evidence of accident, an honest, innocent, and unimpeachable medical man to describe bodily injuries supposed to have been sustained by a person to whom he was summoned in an emergency, one or more expert witnesses to account for the serious effect of such injuries and to relate the probable prolonged disabling results therefrom, it is not strange that the average jury is quick to assess heavy damages against a defending, soulless corporation.

Mulcting the corporations.

So serious has this evil become of late years that manufacturing companies, railways, and common carriers generally, as well as business corporations of all kinds, are forced to seek liability insurance against this class of robbers. The insurance company takes charge of all claims brought against the corporation or individual insured, conducts the defense in litigated cases, and, with the bureau it has organized for the purpose, is prepared to resist excessive and fraudulent claims for damages.

Liability companies the outcome.

Spinal Concussion.—Some years ago we had an epidemic of "spinal concussion," and especially after Ericsson issued his work on what was popularly called railway injuries of the spine. The railways of Europe were thereby robbed fearfully by the concussed. In this country, too, many eminent surgeons, first and last, appeared as experts in litigated cases. Not a few of these bedridden victims of "railway spine" made perfect and almost instantaneous recoveries upon receiving the money awarded them by the courts. But these fraudulent cases required long and tiresome waiting, the principal actor being occasionally so long confined to his room, and even to his bed, in a simulation of paralysis, that he sometimes became hysteric, and ultimately a seriously sick man. The pending suit would drag along in a weary and provokingly slow way until the waiting man would in exceptional cases become almost a physical wreck. It is probable that this fact has made spinal concussion unpopular as a source of revenue. It has, at all events, become ancient history, and is no longer a prevailing, favorite injury. The minor lesions resulting from street accidents are much more popular and attractive; the damages claimed being much less than in the old railway concussion cases, a settlement out of court is speedily effected, and this enables the party to go quickly on his way,

Its drawbacks.

Present unpopularity.

rejoicing. An enterprising person in this line of business has sometimes had two or more claims on hand at the same time, under aliases which he conveniently carried. In a recent instance in Pennsylvania, two claims, one purporting to be by A. K. Johnson and the other by Thomas Burton, resulting from the same accident, were made by one man who proved to be a successful operator in these schemes. He has just been sentenced to a long term at hard labor in the State Prison, and as he is quite advanced in years as well as in crime, it is probable that his brilliant career as an adept in the production of sham injuries has ceased. Covering a period of about ten years, he has successfully practised his deceptions on a good many able physicians.

Professional "accident" frauds.

The injuries which this class of offenders sustain are usually trivial, and the party depends upon his ability to deceive by exaggerating his alleged suffering. It frequently happens that some old deformity or physical defect that has resulted from a prior injury is utilized successfully in simulating recent injuries. The writer is inclined to think, however, that these fraudulent cases have worked successfully in so many instances simply because the unsuspecting surgeon has been wholly off his guard at the time of the first examination, and thereby has easily been led to commit himself to a diagnosis which would not have been made under other conditions.

Expert malingerers.

Credulous surgeons.

The perpetrators of these frauds are usually uninteresting swindlers, and the majority of them are what may be considered amateur performers. Occasionally, a professional actor among them, after a prolonged career attended with variable success or failure, comes to grief, and proves a character study if you have the opportunity to sound him. During an interview with a convicted criminal (who seemed an almost hopeless wretch as he sat in his prison cell narrating his wicked life, dwelling gleefully and with slang phrases upon his success in simulating bodily injury) the writer expressed surprise that he should have expended so much time and study in wrong-doing, when with much less effort he could have accomplished good for himself and for others. We were wholly unprepared for his prompt reply, which was the familiar quotation: "If to do were as easy as to know what were good to do, chapels had been churches, and poor men's cottages princes' palaces."

COMPULSORY ACCIDENT INSURANCE.

In all civilized nations the trend of the law-making power is toward protecting, more and more securely, the rights of the working population. In earlier times there were traces of the ancient, patriarchal form of government, as exemplified in the care of a servant by his master; but as that has gradually become extinct, the relation of the parties is wholly changed, and in its stead the responsibility of the employer for the welfare of his employee and for any accidental injury the employee may have sustained has been defined and declared through legislative acts. In the preceding section upon liability insurance we made reference to the English Employers' Liability Act and the Workman's Compensation Act, both of these ordinances being, undoubtedly, the outcome of the social changes above alluded to. Other European countries have enacted similar laws. In *France* an article of the civil code provides that "every act whatsoever which causes injury to another imposes on him through whose fault that happens the necessity of making compensation." By a new law (1898) definite compensation is provided against injuries resulting from labor accidents. In *Italy* it is attempted to enforce preventive measures, through special laws, for the purpose of protecting workmen against accidents of trade. When such accidents occur, as they necessarily do in consequence of the hazard of occupation, provision is made by law for indemnifying the laborer. Upon the authority of J. Maluquer y Salvador ("Reparation des Accidents du Travail en Espagne") we learn that in *Spain* the principle of compensation for accidental injuries sustained by workmen has been conceded "since ancient times." He cites an edict of the Supreme Council of Castile, in the reign of Charles III, which, in order to prevent the frequent accidents to masons in the capitol, prescribed that after one of these accidents the judges must immediately inspect the house where the man was working, to see if the accident was the result of the negligence of the proprietor. Upon finding such to be the case, it was the duty of the judges to inflict punishment on the proprietor, and to award compensation for the injury done. The Spanish code is now substantially the same as the French in its provisions for

Laws of European nations.

reparation for accidental injuries to workmen. In *Russia* the owners of railway and steamship lines are liable for injuries to workmen, as defined in special legislation of the civil code. Compensation for injury resulting from other labor accidents must be determined under the general articles of the civil law, at the discretion of the court. *Germany* and *Austria* each have workmen's accident insurance laws which provide indemnity to an injured employee or to his legal representatives. These laws have been materially modified by the recent compulsory insurance laws of those countries. In other parts of the world we find recent special legislation touching legal compensation for injuries suffered by workmen. In *Cape Colony* the Cape Parliament passed, in 1886, an Act relating to the "liability of employers to make compensation for injuries suffered by workmen in their service." This Act is in force at the diamond mine district at Kimberly.

We thus have briefly outlined some of the legal enactments of various countries touching the liability of master to servant, for the purpose of showing that these ordinances evidently have paved the way or led up to the later compulsory insurance laws. The application of compulsion in this matter is not restricted to accident insurance, but extends also to sickness and to insurance against disability resulting from old age. The latter forms of compulsory insurance we do not purpose taking into consideration in this article.

Invalidism and old age pensions.

Origin of Compulsory Insurance.—The scheme of compulsory insurance originated in Germany, and found congenial soil in the State socialism of that country. Probably it was founded on the principle of compulsion which was first devised in the health insurance legislation of Prussia in 1854, but it is evident that the idea remained dormant until it received imperial encouragement. Prince Bismarck, when Chancellor, at a meeting of the Reichstag, said: "Give to the workman the right to work, as long as he is in good health; secure to him assistance when ill, and secure to him maintenance when old."

Bismarck's dictum.

Underlying Theory.—The theory of compulsion, as being necessary in workmen's insurance, is based upon the alleged fact that the social condition of the workman has wholly changed; that the employer no longer feels a moral respon-

Paternalism.

sibility of protection toward the laborer; that the industrial accidents or accidents of occupation in no just sense can be attributed to the fault of those who have suffered by them, and that the State exists for the benefit of all, according to the doctrine proclaimed by Bismarck. It is claimed by the advocates of compulsion that neither common law nor the Employers' Liability Act is of any use to the workman who has suffered a disabling injury, except so far as he can avail of them to recover damages through due process of law. To do this is not only expensive to the employer, but it often results in obtaining but small compensation by the employee, after deducting his costs of litigation. An eminent German authority, Dr. Aschrott, in speaking of the conditions existing prior to the adoption of compulsory insurance, says it was found too difficult to prove that the employer had been at fault and was liable to pay indemnity.

Course of German Legislation.—The failure of the Employers' Liability Act caused the agitation for accident insurance by the government. The law of insurance against accident was first proposed in the year 1881, and the bill introduced compulsion to insure in a certain society organization, and this society was to be administered by the government. The liability to contributions to this insurance was to be divided between the workpeople, the employer, and the State. There was strong opposition to this bill, especially to any contribution or subsidy by the State, but nearly the whole Reichstag agreed that there ought to be a compulsory insurance. One year later another bill was introduced, and this second bill dropped the State administration and introduced an administration by separate trades associations (*Berufsgenossenschaften*). These trades associations were to be formed according to the risk which the workpeople employed in each trade were exposed to, so that, for instance, the people who worked in a factory where there was steam machinery would form one association, and the workpeople employed by builders, or some work like that, would form another association. Subsidy by the State was fixed at twenty-five per cent. There was again strong opposition, and the second bill was dropped. Then the government decided, first, to have exact statistical returns show-

ing how many people yearly met with accidents in each trade, and what would be the amount which yearly ought to be paid for these people who were injured by accident. After this statistical return the government came to the opinion that they could have compulsory insurance against accident with contributions only by the employers, and so a third bill was introduced in 1884 and passed with only a very few votes against it.

This first accident insurance law of 1884 referred mainly to industrial trades, and was called the Industrial Accident Assurance Law. The full text of the amended law of compulsory insurance against accidents is very voluminous, and, together with the law of compulsory insurance against invalidity by sickness and old age, would fill more than one hundred pages of this book. The class of workmen subject to it is specifically defined. The insurance is based upon individual wages. Annual earnings are defined to mean three hundred times the average earnings per day.

Annual earnings.

Basis of Indemnity.—The law provides that the insurance shall yield indemnity for bodily injury or death, to be measured as follows: In case of bodily injury the indemnity shall be: (1) Those expenses of cure which arise after the beginning of the fourteenth week from the date of accident; (2) a regular payment, to be made after the beginning of the fourteenth week from the occurrence of the injury, to the person injured, during the continuance of his inability to work. This payment is to be based upon the average earnings per day, of the person injured, during the last year of his employment in that occupation in which the injury took place. In case of complete inability to work the payment is to be 66⅔ per cent. of the earnings during such inability; in case of partial disability the payment is to be determined according to the measure of earning capacity that remains. No right to indemnity shall belong to the person injured if he has intentionally brought about the accident. When the accident results in death, additional indemnities are granted: (1) For expenses of burial, twenty times the daily earnings, but not less than thirty marks ($7.14); (2) a pension to the representatives of the person killed, based on his earnings. In exceptional cases a fixed sum may be paid in lieu of a pension.

Law of 1884.

Distribution of the Expense of Maintenance.—The law provides that the insurance shall be undertaken by trade associations composed of employers (*Unternehmer*) of industries in given districts. The means for paying the indemnities assumed by the trades associations (*Berufsgenossenschaften*) are raised by contributions, which are fixed year by year on the basis of the wages and salaries earned in their respective establishments by the persons insured, and on a "danger tariff," classifying establishments according to the danger of accident in them. These contributions are raised from the members of the trades associations, which associations are composed of employers only, and therefore the burden of this expense does not fall upon the laborer who is insured. In thus throwing upon the employers the cost and the responsibility of these measures it was suggested by the prime movers in this insurance scheme that it would result in the prevention of accidents, because the direct pecuniary interest of employers would require them to seek every possible precaution against the occurrence of accidents. It is made compulsory for employers to give notice of the character of employment, ages, and number of employees in their establishments, and of all changes therein. Representatives of workmen are elected for every section of an association, and provision is made whereby they may participate in the administration. A board of arbitration is provided for every section; it consists of a chairman who is appointed by the government, of two members elected by the association or section, and of two more elected from the insured class by the representatives of the workmen.

It will be noted that indemnity for disability resulting from accidental injuries does not begin until the fourteenth week from the date of accident, the reason being that the disabled person is provided for during the first thirteen weeks by that branch of the compulsory insurance law which governs disability caused by sickness. We may remark, in passing, that the funds for the purposes of this feature of the law are contributed by the State, by the employer, and by the insured person. The Empire pays fifty marks ($11.90) yearly for each person, and the remainder is paid in equal sums by the employer and employed. The employers are responsible for the laborer's portion of this pay-

ment, but are given the right to deduct, from wages, the contribution of the employee at next pay-day.

The Central Bureau.—An Imperial Insurance Bureau is created by the law, and is required to have its seat in Berlin. Its business is to see that associations conform to the requirements of law. All its decisions are practically final.

Austrian and Norwegian Laws.—The action taken by Germany upon the question of State insurance has arrested the attention of all civilized nations. For some years the problem had been periodically a subject of discussion by parliamentary bodies, but while others were deliberating, the Imperial Government of Germany took decisive steps and put the scheme into practical operation through its law upon compulsory insurance. Four years later, in 1888, Austria enacted a compulsory insurance law which evidently was modeled after that of Germany. It has some distinguishing features, however, especially that of having the business managed by *territorial* organizations rather than by trades associations, which make its divisions according to industries. The law at first provided for seven special territorial insurance institutions only, but through later enactments extending the insurance an eighth institution was specifically formed for railway employees. Norway followed closely upon Austria in creating a compulsory insurance law for workingmen, and in doing so adopted the territorial plan of the latter. All other nations of continental Europe have either appointed parliamentary commissions to investigate and report upon the subject of compulsory insurance, or have introduced bills for its consideration by their legislative bodies.

These measures have invariably been the outcome of a prevailing and growing belief in the principle that it is the foremost duty of the State to shield its industrial classes as far as possible from the accidents to which their trades or labor necessarily expose them; and also to provide some practicable method whereby they may obtain compensation in the event of their sustaining disabling injuries as a result of such accidents.

British Laws.—The inherent justice of the theory of protection and of compensation, as indicated in the preceding paragraph, is not only implied in the common law of England, but is more definitely emphasized in the Employers' Liability Act of 1880, and

still more specifically in the Workmen's Compensation Act of 1897. Without doubt, these liability acts have prepared the public mind of England for further legislation in the direction of compulsory insurance for workingmen. So far as we can learn from the voluminous papers which have been published there upon the subject, it is not so clear that the people are in accord with the idea of State socialism, which seemingly pervades the project when the government is required to contribute toward the funds. Strong and effective efforts, looking toward a system of State-aided insurance, are being made, however, and apparently it is but a question of time when England, as a matter of economic security, will adopt the full measure of State supervision of State contribution and of State compulsion.

Lack of Interest Shown in the United States.—On this side of the Atlantic the subject of compulsory insurance has scarcely arrested public notice. It is apparently regarded as an institution of the Old World, and as one not adapted to the conditions of this country. Students of economics have looked into it and have watched its development abroad with much interest. The Department of Labor, in Washington, has made an exhaustive inquiry into its operation in Germany, and the Commissioner has published a special report thereon. That having been done seven years ago, the government has rested with the presentation of its documentary evidence in the case, and there the matter has quietly remained ever since. This lack of interest can not be because there is no occasion for accident insurance in this country, especially for the benefit of its working people. The want of such insurance and the appreciation of it are fully as great as in any other active industrious nation. Possibly the indifference manifested is, in part, due to the fact that voluntary accident insurance is so readily obtainable and so extensively written that the intervention of our government on the insurance question in behalf of its workingmen is regarded as being uncalled for and undesirable.

Let us look a little closer into this. About thirty years ago one of the accident insurance companies in the United States was requested to formulate a plan for the insurance of the employees of the principal railway in Canada. At that time there was very

little statistical data upon which to determine rates of premium to cover the hazards of exposure, according to occupations, to which such employees were subjected. The attempt was made, however. A system of insurance was prepared, put into effect, and thereafter successfully operated by the insurance company for several years. Then a change of ownership and of official management of the road led to the future conduct of this insurance by the railway company itself. Under this system every employee was insured on his entry into the service of the railway company, and each insurance was terminated only by leaving said service. The insurance extended only to accidental injuries happening while on duty. The premiums were paid by monthly deductions, in small sums, from the wages of the insured. This insurance was obligatory, and was made a condition on entering the employ of the railway company. This is probably the first and only instance of compulsory insurance, on this continent, wherein the number of workmen insured was considerable.

Voluntary Accident Insurance.—Throughout the United States a voluntary system of accident insurance of railway employees and of the workmen of large industrial corporations has been in active operation for more than a quarter of a century. Vast numbers of employees are insured in this manner, the employers always encouraging it and affording every facility for its being carried into effect. In some instances employers have openly advocated such insurance, but as a rule nothing is done by them beyond accepting orders for deducting from monthly wages the sums required in payment of premiums. It was learned, quite early in the business, that the laborer looked with suspicion, and sometimes with resentment, upon any active interest taken by his employer in placing the insurance. Some twenty years or more ago the president of one of our large western railways was so forcibly impressed with the value of this insurance to the workmen of his road that, upon learning that there was a large number of them still uninsured notwithstanding the opportunities which had been afforded them, he issued an order practically making it obligatory upon every one of them to become insured without unnecessary delay. Copies of the order were conspicuously posted in

the railway workshops, and otherwise brought to the notice of all employees. The soliciting agents of the insurance company then started out to take the applications of those whom they expected would crowd about them for the purpose indicated. To the great surprise of those agents there was no response on the part of the railway men. On the contrary, they were indifferent or positively sullen. It became evident that compulsory insurance could not be effected in that manner, and the president's order was promptly recalled.

Railway Benefit Associations.—A few of the railways of this country have organized insurance or relief departments for the benefit of employees. All of them are well managed, and doubtless meet the necessities of the workingman in such employ as completely as would be possible for the German law to do. With the exception of the Baltimore & Ohio Relief Department, the enrolment of employees as insured members is voluntary. In the road named membership is, in a degree, obligatory. The Plant system of railway and steamship lines has recently organized an insurance bureau for the benefit of its employees. Membership is obligatory only as a condition precedent to promotion.

Of course it is possible, and perhaps probable, that public opinion and State legislation will ultimately bring compulsory insurance, combined with government aid, as prominently forward in the interest of the workingman of this country as they have in Europe ; but with the recognized advantages which the laborer now enjoys, the urgent need of such legislation does not seem to be appreciably felt at present.

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